City of Kingman
Stockton Hill Road Corridor Study

Evaluation Criteria and Plan for Improvements

Prepared for:

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1.0 INTRODUCTION

Through the Arizona Department of Transportation (ADOT) Planning Assistance for Rural Areas (PARA) program, ADOT and the City of Kingman are conducting a long-range study of the Stockton Hill Road corridor between Detroit Avenue and Northern Avenue to improve the overall mobility and development character of the area. *Working Paper No. 1 – Current and Future Conditions* evaluated the corridor's development framework and transportation network to determine if the corridor would support future travel demand and commercial growth. Deficiencies were identified with respect to the overall safety and circulation of the corridor. Based on these deficiencies, it was determined that mobility and development framework alternatives were viable and should be developed to improve the corridor's access and character.

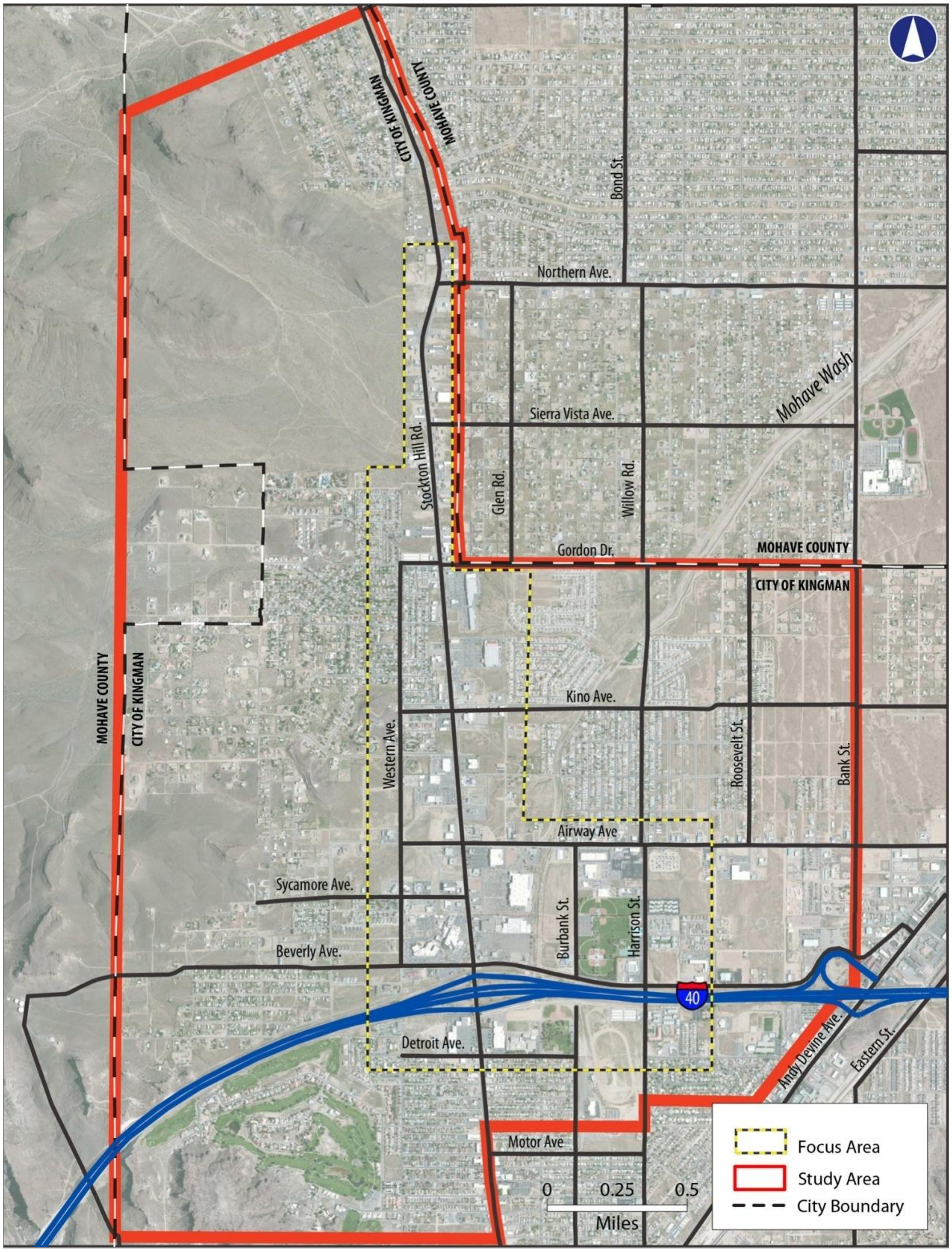
The purpose of this working paper is to address the deficiencies identified in *Working Paper No.1* and develop corridor improvement approaches that will provide safe and efficient access for the various multimodal users of the Stockton Hill Road corridor. The approaches will be evaluated based on criteria confirmed by the project Technical Advisory Committee (TAC) members. The information documented in this report will further identify deficiencies within the corridor, develop improvement alternatives, and develop an implementation strategy for recommended improvements. This study will continue to focus on maintaining the economic benefits and public expectations for an efficient infrastructure system, serving as a guide to address the existing and future travel needs of the corridor's multimodal users.

1.1. Study Area

The Stockton Hill Road corridor study area is located in the north-central area of the City of Kingman, and also includes a small portion of unincorporated Mohave County. The study area extends to Jagerson Street to the north, Bank Street to the east, Florence Avenue to the south, and the City of Kingman limits to the west.

Figure 1 depicts the focus area and wider study area for this corridor study. The study area represents the traffic analysis zone (TAZ) boundaries that encompass the focus area. As stated in the previous working paper, the study area was used to evaluate current and future socioeconomic conditions from the *Kingman Area Transportation Study (KATS) 2011* model. This working paper, however, will concentrate entirely on the focus area where the identified deficiencies are concentrated. Specific consideration is placed on the 2.8-mile segment of Stockton Hill Road between Detroit Avenue and Northern Avenue, where the TAC has identified preliminary corridor needs.

Figure 1: Study Area / Focus Area



1.2. Identified Deficiencies

The following deficiencies were identified in the previous working paper. This working paper will work to address these issues and develop evaluation criteria to suggest an alternative improvement plan.

1.2.1. Traffic Congestion

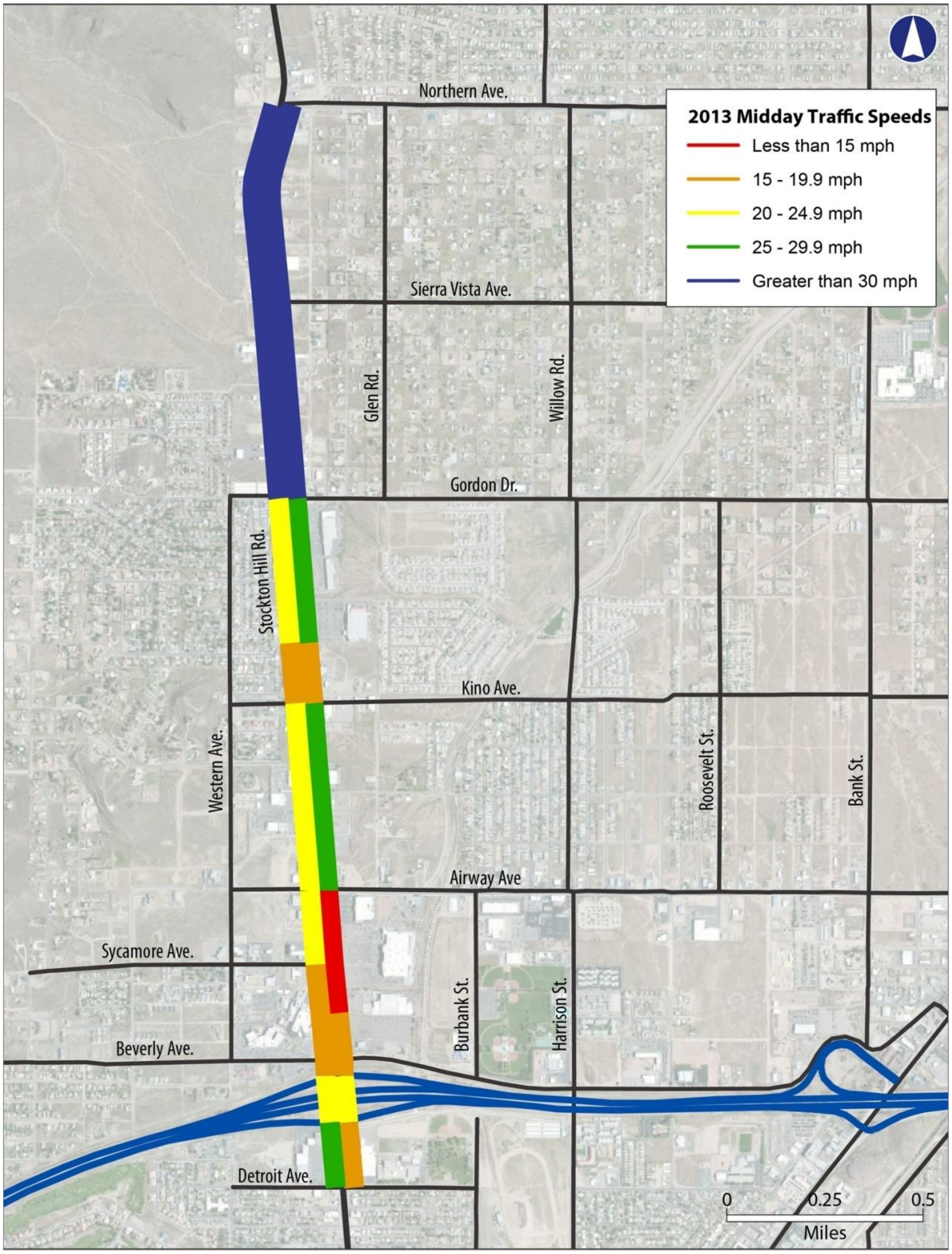
The level of congestion on Stockton Hill Road was analyzed by segment from Detroit Avenue to Northern Avenue. The level of service (LOS) and traffic speed analysis identified several congested segments which suggest a need for additional north-south corridor improvements. Table 1 highlights the midday LOS among corridor segments. Analysis was also done for AM and PM peak periods. However, the midday period was shown to be the most congested. Multiple segments, particularly between Detroit Avenue and Airway Avenue were shown to have an existing midday LOS of D or worse. In rural areas, the acceptable LOS is C or better.

Figure 2 displays the midday traffic speeds along the corridor. The posted speed limit for the entire length of Stockton Hill Road is 35 miles per hour (mph); however, all segments from Detroit Avenue to Gordon Drive experience speeds of less than 30 mph both northbound and southbound. The segment with the lowest speed of less than 15 mph is between the Kingman Regional Medical Center (KRMC) and Airway Avenue. Based on the traffic analysis presented, roadway and traffic improvements are necessary to alleviate the current and future congestion along Stockton Hill Road, as conditions are expected to deteriorate further over time.

Table 1: Midday LOS on Stockton Hill Road (2013)

Roadway Segment on Stockton Hill Road	Northbound LOS	Southbound LOS
Detroit - I-40 EB	D	B
I-40 EB - I-40 WB	C	B
I-40 WB - KRMC	D	C
KRMC - Sycamore	D	D
Sycamore - Airway	E	C
Airway - Kino	B	C
Kino - Home Depot	C	C
Home Depot - Gordon	B	B
Gordon - Northern	A	A
Corridor	C	B

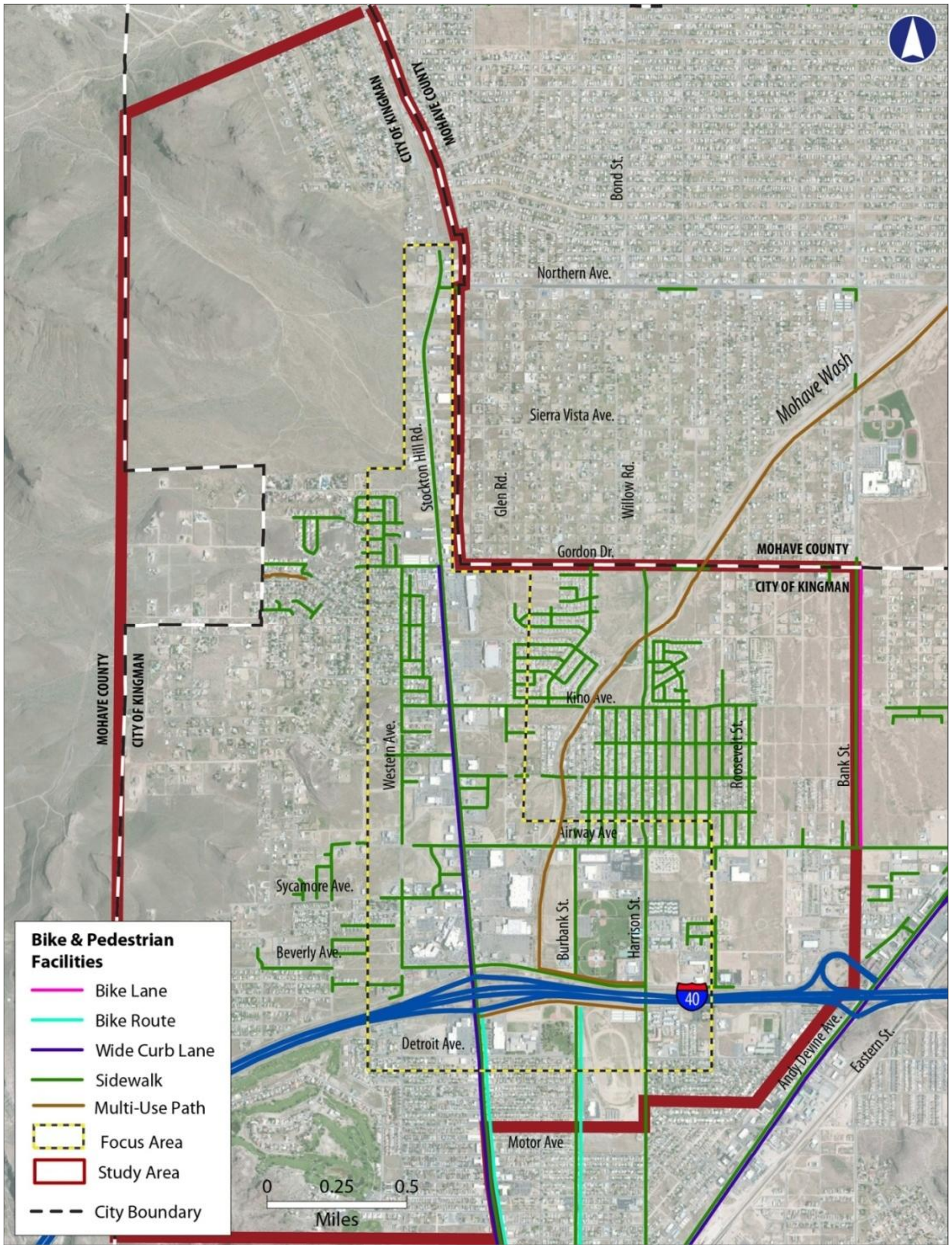
Figure 2: Midday Traffic Speed (2013)



1.2.2. Non-motorized Facilities

As shown in Figure 3, the Stockton Hill Road corridor lacks designated bicycle facilities and interconnected sidewalks. With the exception of two bike routes located south of the I-40 the focus area lacks designated bike facilities. The pedestrian network is comprised of sidewalks and the Mohave Wash Pathway. Although sidewalks are located along the entire length of the Stockton Hill Road, the sidewalks of some adjacent streets have gaps and do not connect. As stated in the *Kingman Area Transportation Study (KATS) 2011*, additional bicycle and pedestrian facilities will be needed to accommodate population and employment growth and sustainable transportation.

Figure 3: Bicycle and Pedestrian Facilities



1.2.3. Beverly Avenue Intersection

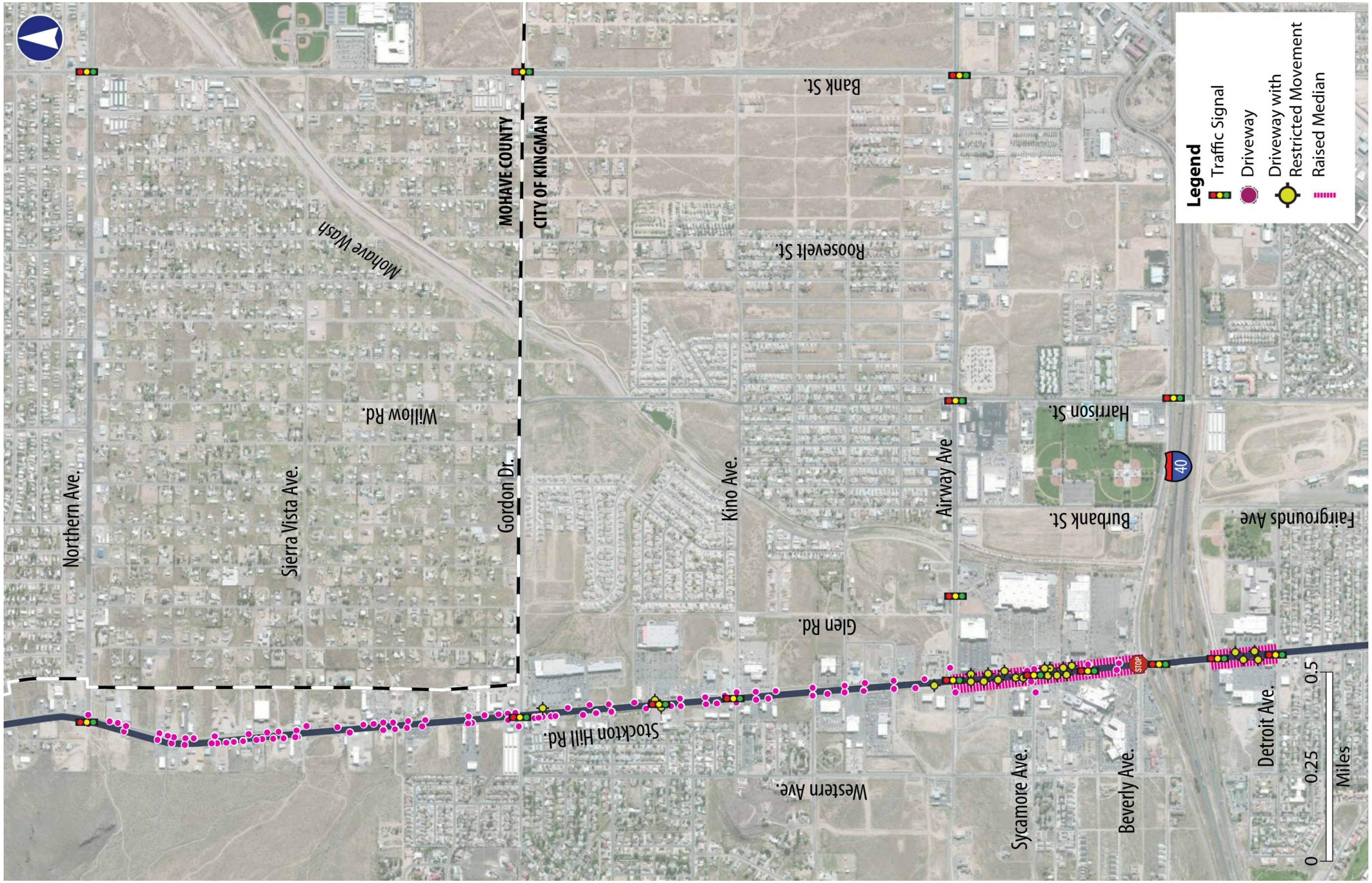
The previously signalized Beverly Avenue/Stockton Hill Road intersection is identified as a particular point of concern due to its proximity to the I-40 westbound ramps and restricted turn movements. The intersection is approximately 210 feet north of the westbound ramps. Stockton Hill Road traffic queues for up to 100 meters behind the I-40 westbound signals, causing severe congestion at the Beverly Avenue intersection. In addition, only right turns can be made from the eastbound and westbound directions on Beverly Avenue; through and left-turns are not permitted. As a result, traffic cuts through the Ross parking lot and uses the KRMC signal to turn left onto Stockton Hill Road or cuts through the KRMC parking lot. Consequently, traffic flow is disrupted, causing potential safety issues. This working paper will address these problems by proposing two alternative improvements. Figure 4 illustrates the areas of concern at the Beverly Avenue intersection.

Figure 4: Beverly Avenue Intersection

1.2.4. Access Management

Current access control strategies in the corridor are limited and include raised medians from Detroit Avenue to Airway Avenue and restricted right and left-turn lanes located at several intersection and midblock locations. Development in the area has come in phases, thus allowing for property access and circulation inconsistencies between adjacent properties. As shown in Figure 5, there are approximately 116 driveways along Stockton Hill Road. In many cases, commercial properties have inadequate driveway spacing and more than one dedicated access location. Primary access for many parcels is located on Stockton Hill Road; rear or side parcel access is infrequent. The configuration of parcel access encourages long strip development and discourages walking. Ultimately, the number, location, and length of curb cuts affect the free flow of traffic and cause automobile and pedestrian conflicts. To accommodate the corridor's anticipated commercial growth, additional access management for Stockton Hill Road is critical for safe turning paths, reduced conflict points with pedestrians and bicyclists, and minimum interference with traffic.

Figure 5: Access Control

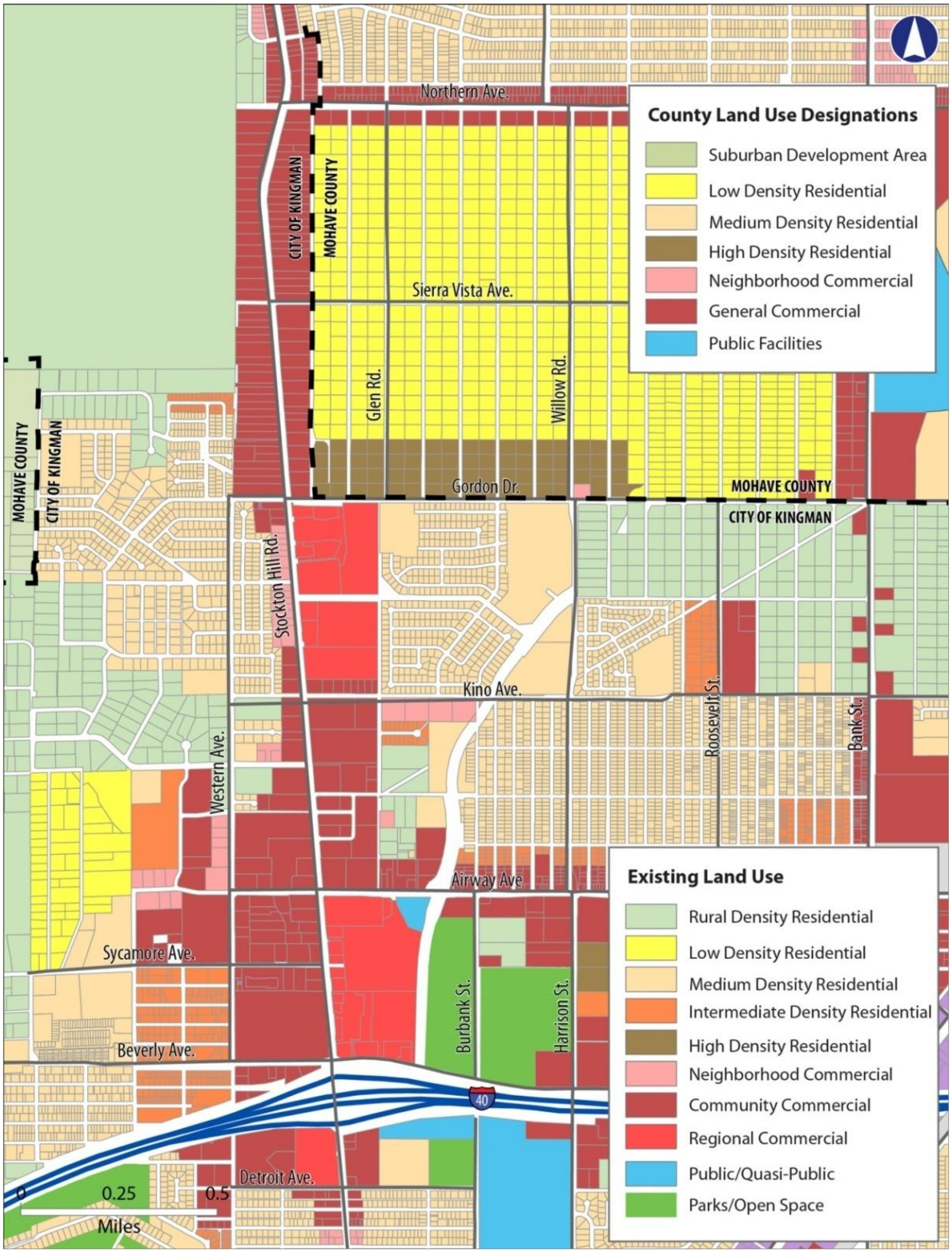


1.2.5. Land Use

The corridor consists of many single-use parcels dominated by big-box retail stores. Commercial development is automobile-oriented and concentrated along Stockton Hill Road. As shown in Figure 6, current land use designations in the focus area are predominantly commercial with a mix of residential, public, and open space uses. With the exception of residential areas, parcels have inconsistent lot depths which discourage pedestrian activity and encourage automobile usage. Narrow parcel frontages on cross streets create a development scenario with multiple small single-use parcels, each with their own access point within close proximity of the adjacent parcel. This parcel pattern of parcel assembly discourages development of larger commercial centers, and compounds access control issues.

As stated in the *City of Kingman General Plan*, future commercial growth presents opportunities for further residential development in the study area. While KRMC will continue to expand, growth is limited by Beverly Avenue, Western Avenue, Sycamore Avenue, and Stockton Hill Road. Land use policy improvements are necessary to support this anticipated growth and increased traffic flow and congestion.

Figure 6: Existing Land Use



Source: City of Kingman Official Zoning Map (2012) and Mohave County parcel data

1.2.6. Development Policy

The City of Kingman's development policies cater to the corridor's automobile-oriented commercial growth. Currently, the majority of the focus area is zoned for commercial use, facilitating the development of big-box retail stores and strip malls. Because the corridor supports many commercial uses, flexible on-site parking and setback requirements for the corridor lead to an overabundance of parking lots and inconsistent frontages set back far from the street. The City's Zoning Ordinance lacks shared parking standards and permits commercial developments to meet setback requirements with parking lots. By allowing for significant setbacks from the roadway to the store, the City's development framework discourages walking, diminishing the pedestrian experience.

In addition, the excess of strip development and parking lots results in an overabundance of access points to Stockton Hill Road. Many commercial properties have more than one driveway to access the property, thus affecting the right travel lane on Stockton Hill Road and contributing to the overall congestion of the corridor. The City's development policies for the corridor have resulted in the disruption of traffic flow and act as an impediment to pedestrian and non-motorized traffic.

1.2.7. Character and Urban Form

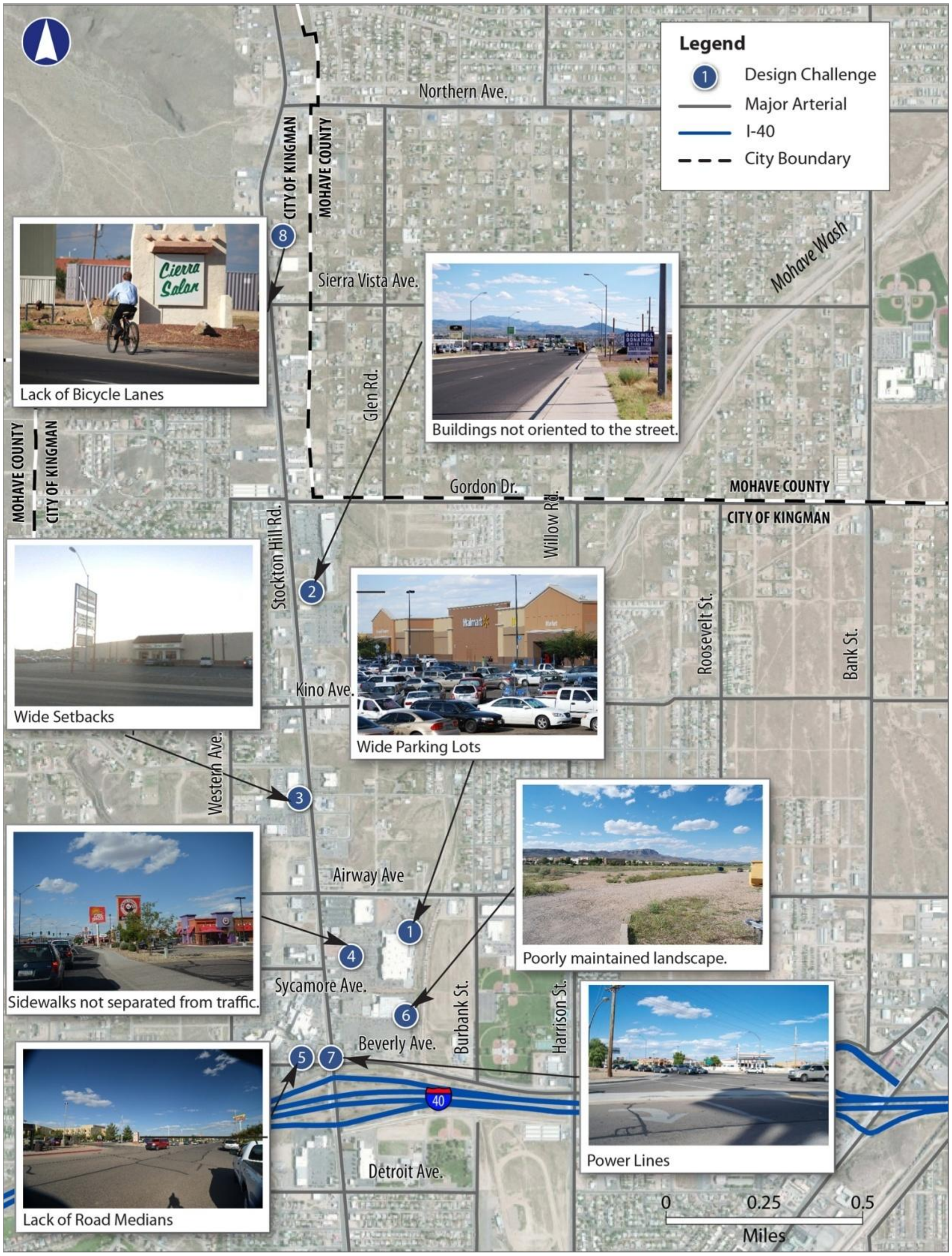
As the City has evolved, the City's transportation and development policies have defined the corridor's character. Due to the flexible nature of the development framework, the corridor is primarily characterized by single-purpose land uses situated on large parcels. Retail stores and parking lots dominate the area, creating a development pattern with limited multimodal connectivity between uses.

As a result of the City's development policies and the subsequent character of the corridor, various design challenges inhibit multimodal connectivity. The current physical constraints and development policies of the area lead to a corridor which favors automobile and parking opportunities, often unintentionally impacting mobility, access, and safety of pedestrians. The challenges listed below and illustrated in Figure 7 impact the improvements that can be made to the existing circulation network and development pattern.

1. Buildings are often separated from the street by wide over-sized parking lots that can impede pedestrian access and safety.
2. Many buildings are not adequately oriented to the street.
3. Wide setbacks create a massing of asphalt, which can degrade street appeal, and leave an undefined street edge.
4. Some sidewalks are poorly maintained, narrow, un-shaded, and not separated from roadway traffic or parking areas, diminishing the pedestrian experience.
5. Lack of medians can increase congestion, potential for collisions, and fail to provide a refuge for pedestrians crossing busy streets.
6. Some landscape areas are poorly maintained, creating an uninviting appearance and inhospitable environment for pedestrians and cyclists.

7. Power lines are visible and abundant, which can create challenges to widening sidewalks and also degrade street appeal.

Figure 7: Design Challenges



1.2.8. Safety

Based on the deficiencies previously identified, safety for motorists, pedestrians, and bicyclists is an area of concern. The corridor's commercial strip development is planned primarily for automobile access, negatively impacting pedestrian and bicyclist mobility, safety and access. As a result, pedestrian and bicyclists share the roadway with motorists, creating dangerous conditions for pedestrians and bicyclists. Of particular concern is KRMC, which has a high volume of pedestrians and motorists. In the past, there have been several pedestrian and motorist collisions. Furthermore, commercial developments along the corridor generate large traffic volumes in the relatively small area, increasing congestion and the potential for conflict between multimodal users.

1.2.9. Circulation

In addition to safety, circulation issues arise from the aforementioned deficiencies. Within the study area, Stockton Hill Road serves as the primary north-south route, connecting Kingman to I-40 and surrounding areas. Because current policies have encouraged development to be concentrated on Stockton Hill Road, the roadway network is extremely congested in the form of suburban style throughfares and lacks alternative travel routes in a fully developed grid network. The abundance of strip development and parking lots restrict turn movements on the right travel lane, and ultimately disrupt traffic flow along the corridor.

2.0 PRELIMINARY IMPROVEMENT APPROACHES

This section addresses the deficiencies listed in Section 1.2 through two different improvement approaches: (1) mobility approaches and (2) development framework approaches. The mobility and development framework approaches presented in this working paper are developed from the study's goals and objectives, as well as input from community stakeholders and the public. Mobility approaches are more technical design solutions which provide mobility, safety, and congestion relief. Development framework approaches are more long term prioritized strategies which focus on policies that affect the development and evolution of the built environment. Section 3.0 evaluates each category separately and provides a detailed description of each improvement and policy solution. Section 4.0 includes an implementation strategy for prioritized improvements.

2.1. Mobility Approaches

Mobility approaches were developed to improve safety and reduce congestion along the corridor. These approaches are more technical in nature and include traffic operations, access control, non-motorized improvements, and specific design solutions for the Beverly Avenue intersection. The goal is to relieve congestion and increase multimodal mobility and safety. Because Stockton Hill Road carries the bulk of the corridor's traffic volume, improvements in this section will be focused on Stockton Hill Road itself.

2.1.1. Traffic Operations

Traffic conditions within the corridor were analyzed as part of *Working Paper No.1*. Evaluation of the existing and future traffic operations on Stockton Hill Road revealed that the intersections within the corridor are projected to operate at the acceptable LOS of C or better for the short term (2015), mid term (2020) and long term (2030) horizon years. However, an analysis of corridor segments showed that northbound and southbound segments, between Detroit Avenue and Airway Avenue exhibited less than acceptable LOS and speeds, and that traffic conditions would continue to decline in the future.

Traffic operations within the corridor currently do not operate at optimal levels. Factors contributing to poor traffic performance include multiple closely spaced driveways, a lack of access alternatives, closely spaced intersections, and contributing regional traffic flow from I-40.

There are several traffic engineering related approaches which could be utilized to improve traffic operations and enable more efficient traffic management within the corridor, including traffic signal timing and synchronization, intelligent transportation systems (ITS), and intersection capacity improvements. These three approaches are detailed in the following sections.

2.1.1.1. Traffic Signal Timing and Synchronization

A traffic signal at an intersection should be ideally programmed to properly proportion the amount of green time allotted to different intersection movements based on demand. The goal is to minimize overall intersection delay and maximize traffic flow through the intersection. However, achieving optimal performance at an individual intersection does not necessarily result in the optimal performance of an entire corridor. For the most efficient signal operation along a corridor, the programmed timing of green signals throughout the corridor should be coordinated to optimize corridor traffic flow.

Signal coordination allows for the green signal at downstream intersections to be offset from the upstream intersections in such a way that groups of automobiles travelling at the proper speed arrive on at a green signal and do not have to wait at intersections. For Stockton Hill Road, the slow segment speeds discussed in Section 1.2.1 suggest a lack of coordinated flow through the intersections, especially along the south side of the corridor between Detroit Avenue and Airway Avenue. As part of a signal timing and synchronization effort, it is also important to ensure that pedestrian signal and crosswalk timing is not affected in a way which restricts pedestrian access. Synchronization for the benefit of automobile traffic flow should not be implemented in a way which detracts from other travel modes.

Once a corridor is coordinated, the efficiency of traffic control should be continuously monitored to ensure that signal timing meets the traffic demand. For a region like Kingman which has experienced sustained growth, traffic signals should be retimed at least once every three years. The last retiming effort for intersections along the corridor was completed in 2008. Signal retiming and coordinating could improve corridor traffic flow. Retiming and coordinating signals will help in achieving better traffic flow through the corridor which results in perceptible improvement to the users. It also provides secondary benefits such as reduction in crashes and reduction in emissions. Signal coordination and retiming yields much higher benefits than costs. However, signal timing works best when complemented by a coordinated ITS, which is explained in the next section.

2.1.1.2. Intelligent Transportation Systems

ITS elements are an important consideration in improving the traffic flow of a corridor, and can greatly complement a signal timing and coordination effort. One of the essential elements of coordinated signal operation is for the internal controller clocks to be synchronized. Internal controller clocks can drift from the true time; as a result, timing parameters such as plan offsets which are referenced to a common start point can vary. This can result in a loss of signal synchronization along the corridor. Various signal and traffic signal system upgrades could be adopted to ensure the corridor is coordinated. These elements are discussed in the following sections, and include GPS clock receiver and interconnect systems, interconnect systems with central control, and adaptive signal control. It should be noted that the improvements discussed here assume a signal retiming effort for the Stockton Hill Road Corridor.

A. GPS Clock Receiver & Interconnect Systems: Global Positioning System (GPS) satellites carry on-board atomic clocks. These satellites broadcast location and time information for receivers on the ground. GPS clock receivers are devices which when installed in a traffic signal cabinet use the GPS time information to set the internal time clocks of traffic signal controllers. Typically GPS clock receivers are deployed in two configurations to prevent controller clock drift and achieve signal synchronization. In the first method GPS clock receivers are installed at all signal control cabinets at intersections along the coordinated corridor. The GPS clocks at all the intersections are programmed to set the controller at the same time(s) everyday. In the second method the GPS clock receiver is installed in one cabinet at an intersection which is designated as the master intersection. All the signal controllers along the corridor are connected to the master controller using a wired or wireless interconnect system. The interconnect system provides for a communication channel between the cabinets. The master controller or the GPS clock utilizes this to set the controller clocks for all the intersections at the same time(s) everyday. Having synchronized controller clocks will ensure that the benefits from a traffic signal retiming effort are realized over a longer period of time (as long as traffic flow characteristics do not change).

B. Interconnect System with Central Control: In this system the traffic signal controllers are connected to each other and a Traffic Management Center (TMC) using wired, wireless or hybrid (mix of wired and wireless) communications network. The TMC will have a central system that will help monitor intersection and corridor performance. Data from the intersection controllers can be used to evaluate if the corridor or system is performing optimally. It provides timely notification of equipment failures at intersections, which enables agencies to fix issues proactively. Closed-circuit television (CCTV) cameras can be deployed at key intersections to monitor intersection performance. One of the major advantages of this type of system is that system performance data can be used to make changes to signal timing as and when needed, ensuring optimal system performance. Central system allows the agency to have special signal timing plans for special events and for managing incidents. These can be put in effect from the central system in a much faster and efficient manner.

C. Adaptive Signal Control: An adaptive system is a special case of an interconnect system with central system. In an adaptive system the traffic flow is monitored and measured using detectors at and in advance of intersections. This data is transmitted to the adaptive control central system which processes the data from all the intersections to provide the controllers with the most efficient signal timings to maximize traffic flow and minimize vehicular delay for the corridor or the system. This type of system is very effective in managing traffic flow through a corridor that has a highly stochastic traffic demand. The City of Grapevine, Texas, in the Dallas - Fort

Worth region, maintains one of the largest integrated adaptive signal control systems in the Country deployed on all major arterials.

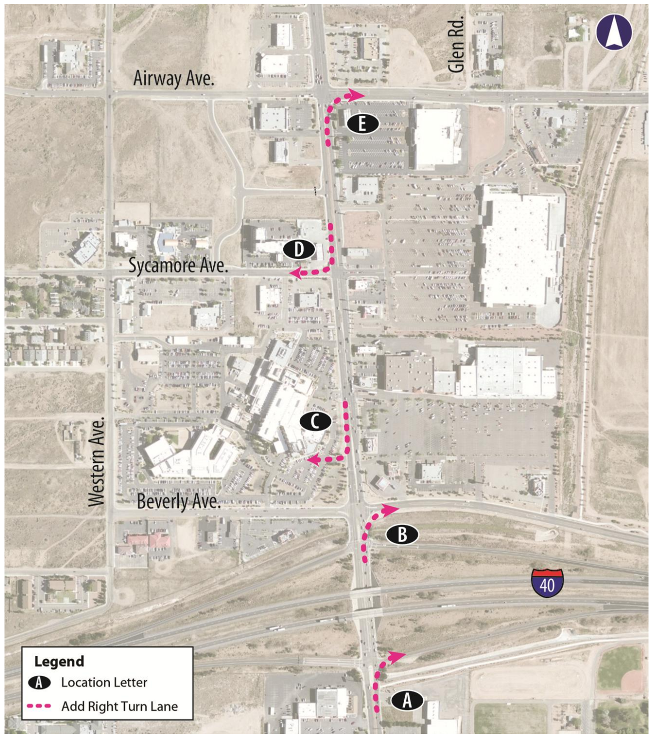
ITS upgrades previously mentioned would allow for more efficient signal operation. The installation of such systems could improve traffic signal coordination and assist in effectively managing the traffic flow of the Stockton Hill Road corridor. By integrating advanced transportation technologies into the current infrastructure, ITS can ultimately improve the corridor's transportation safety and mobility.

2.1.1.3. Capacity Improvements

Capacity improvement alternatives involve the addition of turn lanes at intersections or the addition of additional through lanes. At locations where there are existing shared through and turn movements, adding channelization for turn lanes will reduce delay for through automobiles. These improvements are primarily needed in the segment between Detroit Avenue and Airway Avenue. The improvements considered are listed below and shown in Figure 8.

A. Add Right turn lane for Northbound Stockton Hill Road at the intersection with I-40 EB on-ramp.
B. Add Right turn lane for Northbound Stockton Hill Road at the intersection with Beverly Avenue.
C. Add Right turn lane for Southbound Stockton Hill Road at the intersection with KRMC.
D. Add Right turn lane for Southbound Stockton Hill Road at the intersection with Sycamore Avenue.
E. Add Right turn lane for Northbound Stockton Hill Road at the intersection with Airway Avenue.

Figure 8: Capacity Improvements



2.1.2. Access Control

Access control is an important aspect in achieving optimal automobile circulation within a corridor. An ideal access control policy would seek to preserve roadway capacity, safety, and the level of traffic service while simultaneously providing access to activity centers. Policies are typically implemented through access management codes and include considerations such as spacing criteria, design standards, and traffic permit procedures specific to designated functional classifications. An effective policy or program would also complement access considerations included in local land use controls and zoning ordinances in order to coordinate transportation and land development over the long term.

The implementation of access control standards along an already established commercial roadway is often more challenging and complex compared to an undeveloped corridor. Land for needed improvements is often unavailable, making certain access management techniques impossible to implement and requiring the use of minimum rather than desirable standards. The legal, social, and political aspects of access management, including the rights of access to existing property, are also particularly relevant in retrofit situations and should be thoroughly understood by those responsible for implementation.

The following access management principles were used to develop improvement approaches for the Stockton Hill Road corridor. The included principles address the existing access and circulation deficiency along the corridor:

Minimum Access Spacing / Driveway Location

Minimum access spacing between driveways or side streets provides sufficient perception-reaction time to address one potential conflict area at a time. Guidelines for minimum un-signalized driveway or local street spacing should consider the speed of the major roadway, stopping sight distance, the elimination of right-turn conflict overlays and the functional area of the access points. The functional area of any access point should be kept clear of any additional points of access.

Driveway location should be influenced by the following factors: the amount of site frontage available for access, the approach directions of development traffic, the locations of existing cross streets and traffic signals, the queuing patterns along the artery, the traffic signal coordination requirements, and the location of nearby driveways. Minimum spacing standards can be established for the distance between driveways. For example, the City of Peoria, Arizona follows a minimum spacing guideline of 180 feet on roadways with a speed limit of 35 miles per hour[1]. For intersection/access spacing, best practices state that driveways that are closer than 100 feet from a public street intersection should be candidates for closure, and that left turns to or from driveways within 100 to 200 feet of a signalized intersection should be prohibited by a sign or by a center median.

Corner Clearance

Corner clearance is the distance from an access drive and the nearest cross road intersection. The distance should provide drivers with adequate perception-reaction time (typically accepted as 2.5 seconds) to assess potential downstream conflicts and is intended to prevent driveways from being located within the functional area of an intersection. Corner clearance requirements will also minimize driveway/intersection conflicts by preventing blockage of driveways upstream of an intersection due to standing signal queues.

Medians/Median Openings

Medians are the center portion of a roadway that separate opposing traffic flows, not including a center two-way left turn lane. A non-transferable, or raised median, includes a physical barrier such as a concrete structure or landscaped island that restricts left turn movements. Directional median openings should ideally be limited to every ¼ mile on arterials and major collectors.

Internal Site Circulation / Thru-Access

To promote unified access and circulation systems, unified parcels should include developments under the same ownership or consolidated developments comprised of more than one building site. The number of connections permitted should be the minimum number necessary to provide reasonable access to the overall site and not the maximum available for that frontage. Access to parcels should be internalized using

[1] City of Peoria, Arizona – Access Management Guidelines 2011

the shared circulation system and designed to avoid excessive movement across parking aisles or queuing across surrounding parking and driving lanes. Where abutting properties are in different ownership and not part of an overall development plan, cooperation between the various owners in development of a unified access and circulation system is encouraged.

Recommended Improvements

Figure 9 to Figure 11 show the most feasible access control solutions for the corridor with respect to site topography, physical impacts to property owners, and ease of implementation. The solutions shown are improvements that can be implemented to reduce friction along the Stockton Hill Road corridor. They are listed numerically from south to north and are not necessarily in implementation order. Consideration should be given to the potential economic impacts to property owners due to reduced number of parcel access points.

Access control solutions provided for the Stockton Hill Road corridor includes closing driveways, consolidating or combining driveways, providing thru-access between parcels, and installing raised medians/channelization locations. It is important to note that consolidating or combining driveways would take place at locations with two separate but adjacent driveways. One of the two driveways would be closed to create a single shared driveway.

As shown in Figure 9 to Figure 11 and Table 2, location numbers 4, 5, 7, 12, 13, 14 and 15 provide increased access control by closing or combining driveway locations. Location numbers 3, 6, 8, 9, and 10 provide a thru-access location between adjacent parcels, allowing for internal site circulation. Locations 1, 2 and 11 provide left turn bays and channelization features to the roadway median. (See Figure 12 and Figure 13 for concepts at these median locations.) For a map all of the proposed locations see Figure 9 through Figure 11. The recurring elements impacting the selection of recommended improvement locations are: minimal driveway spacing with adjacent properties, multiple/excessive driveways per parcel frontage, and insufficient corner clearance. Many of the solutions below can be implemented in a number of combinations and in any order. The suggested order is presented in Section 4.0 and is based on the cost of the improvement at each location.

A Traffic Impact Analysis (TIA) was completed in July 2013 for the proposed redevelopment of the vacant shopping plaza located at the southeast corner of Stockton Hill Road and the I-40 eastbound ramps. To improve access control and safety, and eliminate ongoing vehicle congestion, the TIA proposed the reconfiguration of the Stockton Hill Road and Detroit Avenue intersection. Specific components of the TIA concept included the provision of a left turn channelization for access to the property from southbound Stockton Hill Road, a raised median with left turn channelization on Detroit Avenue east of the intersection, and the closing of direct access drives servicing the northeast corner parcel (currently a Circle K).

The driveway closures, left turn medians, and lane configurations as proposed in the report *Retail Development SEC Stockton Hill Road & I-40 Traffic Impact Analysis* (prepared by Lee Engineering for Wadsworth Development Group), were evaluated using the existing Synchro traffic model for the purposes of the Stockton Hill Road Corridor study. The analysis revealed that the existing corner parcel driveways did not have significant impacts on the traffic signal operations at the intersection of Stockton Hill Road and Detroit Avenue. The intersection would continue to operate at LOS B in both conditions. However, the left turn median on Detroit Avenue did show an improvement to traffic conditions and has been incorporated into this document as a recommendation. In order to allow full access to the corner Circle K parcel and redevelopment parcel, the left turn median concept is recommended to be implemented in conjunction with a parcel thru-access improvement (Access Control Locations 2 and 3).

In addition, a VISSIM model was developed to evaluate the impact of queuing resulting from the proposed left turn channelization on southbound Stockton Hill Road north of the Detroit Avenue intersection (shown as location 1 in Figure 12). Current year midday traffic volumes were used for the analysis, as they represent the most congested period throughout the day. The analysis showed that the left turn median would not result in significant queuing that would impede through traffic flow and increase congestion. The maximum queue length was found to be approximately 74 feet (4 car lengths) which would not decrease safety conditions or cause conflicts with I-40 ramp traffic.

Table 2: Access Control Solutions

Location Number	Type of Solution	Solution Notes
1	Install left turn bay / channelization: Between Detroit Avenue and I-40	• No existing left turn access, blocked by existing continuous raised median • Plan for future adjacent parcel development
2	Install left turn bay / channelization: Along the east leg of Detroit Avenue / Stockton Hill Road intersection	• Existing EB left turn movement into the Circle K driveway queues into the intersection • Corner clearance (<100’) • Plan for future adjacent parcel access and development (in conjunction with Location 3)
3	Provide thru-access: Between Circle K and the Tractor Supply development	• No existing access between parcels • Existing raised median on Stockton Hill Road prevents left turn movements into the parcels • Plan for future adjacent parcel access and development (in conjunction with Location 2)
4	Close driveway: At KRMC and south of O’Reilly Auto Parts	• Driveway spacing with adjacent properties (<100’) • Provides additional parking
5	Combine driveways: Chevron	• Driveway spacing within property (<100’) • 3 existing access points • Contributes to side friction on Stockton Hill Road • Corner clearance (<100’)
6	Provide thru-access: Between Wal-Mart and Ross/Petsmart	• No existing access between high-traffic parcels • Contributes to side friction along Stockton Hill Road

7	Close driveway: Del Taco	• Corner clearance (<100') • Existing driveway is location within a dedicated right turn bay
8	Provide thru-access: Between AutoZone and Smith's	• No existing access between parcels • Contributes to side friction along Stockton Hill Road • Existing dead-end customer parking lot
9	Provide thru-access: Between Wal-Mart and Smith's	• No existing access between high-traffic parcels • Contributes to side friction along Stockton Hill Road
10	Provide thru-access: South of Chase Bank	• No existing access between parcels • Driveway spacing with adjacent properties (<150')
11	Install raised median / left turn channelization: Between Kino Avenue and Gordon Drive	• Consistent with termini • Plan for future adjacent parcel access and development
12	Close driveway: Stockton Hill Tire	• Driveway spacing with adjacent properties (<150') • 2 existing access points
13	Combine driveways: Action Automotive Center	• Driveway spacing with adjacent properties (<150') • 2 existing access points
14	Close driveway: Circle K	• Corner clearance (<100') • 2 existing access points
15	Close driveway: Hyundai dealership	• 3 existing access points • Contributes to side friction along Stockton Hill Road

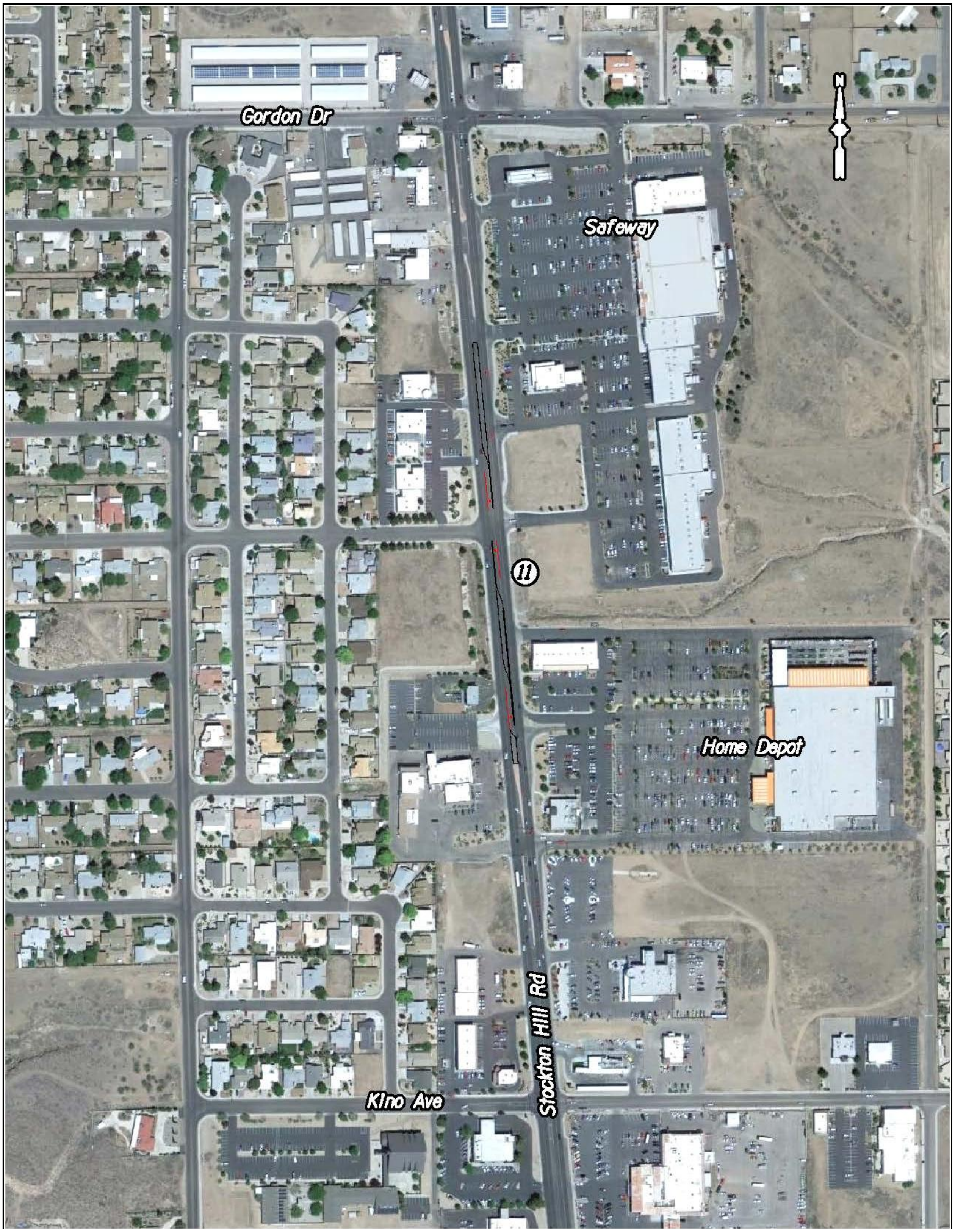
Figure 9: Access Control Solutions

Figure 10: Access Control Solutions

Figure 11: Access Control Solutions

Figure 12: Access Control Concept - Locations 1, 2, 3

Figure 13: Access Control Concept - Location 11



2.1.3. Beverly Intersection Improvements

The existing Beverly Avenue intersection is in close proximity to the I-40 WB Off-Ramp, WB On-Ramp and I-40 EB and WB overpass structures. Beverly Avenue is currently a two-way roadway, functioning much like an interstate frontage road through the Stockton Hill Road area. Currently, only right turns are permitted at the Beverly Avenue intersection through the use of channelization islands and signage. Through and left turn movements are not permitted. The adjacent properties experience significant cut-through traffic from drivers wanting to complete the through and left turn movements at this intersection.

A Design Concept Report (DCR) for this intersection was completed in 1999 and analyzed options for the Beverly Avenue intersection. The preferred alternative recommended by the study was to install a standard roundabout at the existing intersection. An additional roundabout analysis was conducted in 2000, which found that due to directional volume imbalance on Stockton Hill Road, a traditional roundabout would not provide necessary capacity improvements.

Based on traffic analyses of current data and field investigations, the segment of Stockton Hill Road from Detroit Avenue to Airway Avenue experiences the most congestion along the corridor, with the Beverly Avenue intersection potentially being the lynchpin for improvements to Stockton Hill Road through traffic, as well as improved circulation movements for the adjacent street network and neighboring developments.

Four preliminary Beverly Avenue improvement alternatives were developed and presented at the project Technical Advisory Committee (TAC) meeting in May 2013:

Alternative 1: Standard Roundabout

Alternative 2: Elongated Roundabout

Alternative 3: Moved Ramp Terminus (J-Hook)

Alternative 4: Single Controller for Interchange and Beverly Avenue intersections

A VISSIM analysis was developed to pare the four alternatives evaluated down to two feasible alternatives that restore directional movements to the Beverly Avenue intersection and provide the necessary traffic capacity for Stockton Hill Road. Based on the analysis, the Elongated Roundabout and Moved Ramp Terminus (J-Hook) were selected for further study. These two alternatives are detailed in the following sections.

<u>Advanced Alternative 1: Elongated Roundabout</u>

Roundabouts have recently become popular in the United States as they have proven to serve all approaches in a yield condition while maintaining a safe driving condition for users. An elongated roundabout is suitable for the Beverly Avenue/Stockton Hill Road due to the large amount of traffic and proximity of nearby intersections. This alternative was developed to prevent queuing within the limits of a standard roundabout and is shown in Figure 14. The advantages and disadvantages are discussed below:

Advantages:

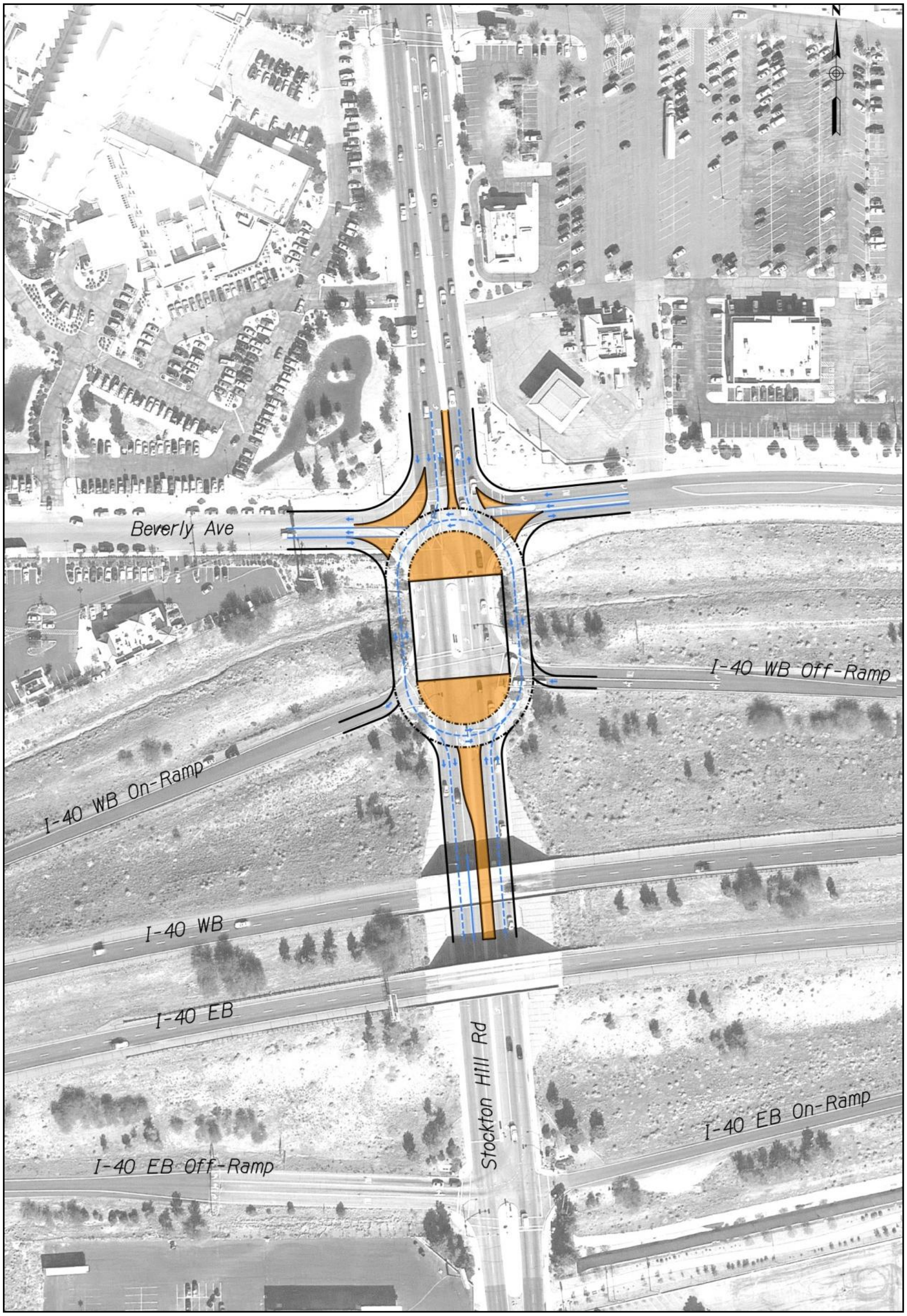
- Provides left turn movements from Beverly Avenue that are currently not permitted
- Minimal impacts to the existing roadways of the roundabout approach legs
- Eliminates signal at I-40 WB On-ramp and Beverly Avenue
- Reduces the number of conflict points through both intersections
- Reduces the number of stops for automobiles making the through movement on Stockton Hill Road
- Lower operations and maintenance costs versus a traditional signal
- East-west neighborhood connectivity

Disadvantages:

- Non-standard concept, driver population may need to adjust to the new concept
- May result in greater delay for the Beverly Avenue/I-40 WB movement compared to other alternative
- Higher initial build cost compared with other alternative
- Requires greater amount of right-of-way to construct compared to other alternative
- Potential for queuing at multiple locations, including southbound Stockton Hill Road between KRMC signal and westbound I-40 onramp, and westbound I-40 off ramp.

The items above were used in the evaluation of the alternatives, shown in the tables of Section 3.2.1.3.

Figure 14: Advanced Alternative 1 – Elongated Roundabout



Advanced Alternative 2: Moved Ramp Terminus (J-Hook)

This alternative would realign the existing I-40 WB Off-ramp and construct a new terminus on Beverly Avenue, east of Stockton Hill Road. As shown in Figure 15, the existing traffic signal at the I-40 WB ramp termini would be removed. The J-Hook concept was developed to eliminate a movement from the Beverly Avenue signal and move traffic volumes from Stockton Hill Road to Beverly Avenue. The advantages and disadvantages are discussed below:

Advantages:

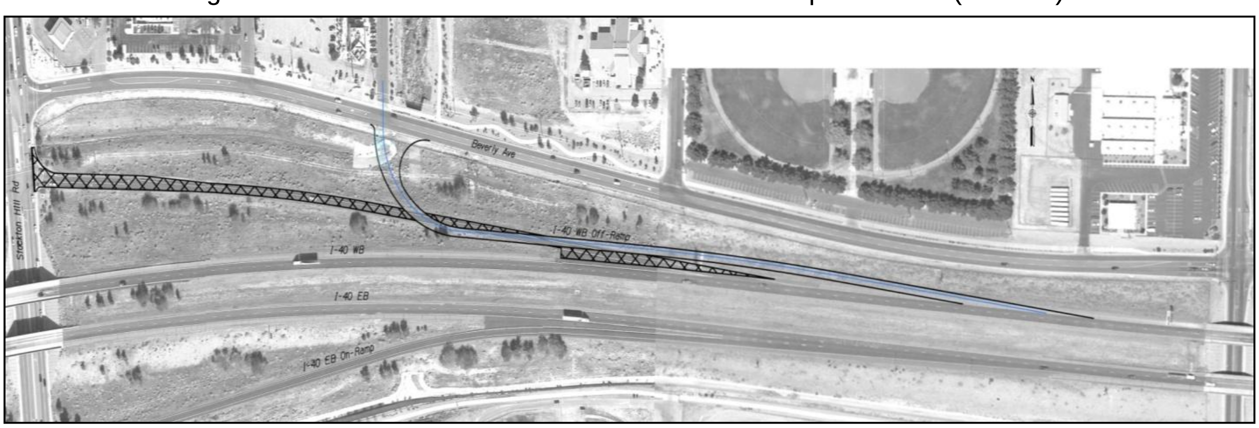
- Allows more storage for the northbound to westbound movement from Stockton Hill Road to Beverly Avenue
- Reduces the accident type (drivers disobeying channelization) at Beverly Avenue
- Eliminates the signal at I-40 WB On-ramp
- Reduces delay for the I-40 WB Off-ramp movement
- Allows Beverly Avenue/Stockton Hill Road intersection to function as a standard 4-leg signal with all movements permitted

Disadvantages:

- Would require a Change of Access Report through Federal Highway Administration (FHWA)
- Would require a public hearing as part of the Change of Access Report
- Would require ADOT design and district acceptance
- Non-standard ramp terminus geometry/design, driver population would have to adjust to new design
- Initial VISSIM modeling indicated that the J-Hook would stop functioning as a viable option due to increases in traffic over the next 15 to 20 years, indicating that this alternative may not meet the purpose and need of the corridor study.

The items above were used in the evaluation of the alternatives, shown in the tables of Section 3.2.1.3.

Figure 15: Advanced Alternative 2 – Moved Ramp Terminus (J-Hook)



2.1.4. Non-motorized Improvements

The provision of non-motorized infrastructure is crucial in promoting a sustainable, pedestrian- and bicycle-friendly environment. The *Kingman Pedestrian and Bikeway Plan (2000)* identified the Stockton Hill Road corridor as a specific area in need of additional pedestrian and bikeway improvements, as the existing pedestrian and bicycle facilities within the corridor are somewhat limited and disconnected, lacking a complete network of sidewalks and bicycle lanes, and lacking any midblock crossings completely. Well-designed pedestrian and bicycle facilities integrated with nearby land uses have the potential to provide social, economic, environmental, and aesthetic benefits to the overall community. In addition, corridors such as Stockton Hill Road could lesson automobile congestion and improve traffic flow by encouraging alternative modes of transportation.

The *Kingman Pedestrian and Bikeway Plan (2000)* provides the following design criteria for bicycle and pedestrian facilities targeted for the Stockton Hill Road corridor:

- *Sidewalks*:
  - Minimum 5 feet wide on major and minor arterials
  - Minimum 4 feet wide on collectors, local, and rural streets
  - Typically used by pedestrians or inexperienced slow-moving bicyclists
- *Bike Lanes*:
  - Striped, one-way travel lane on the street
  - Minimum 4 feet from the edge of pavement
  - Minimum 5 feet from face of curb
- *Wide Curb Lanes*:
  - Wider lane on a street that provides more room for bicycle travel
  - Not specifically designated as a bicycle area and can be used by automobiles
  - Typical width is 14 feet for the outside lane with an optional lane stripe

A review of non-motorized facilities was performed in order to identify areas of need for potential improvements. The review was based on the findings of previous studies such as the *Kingman Pedestrian and Bikeway Plan (2000)* and the *Kingman Area Transportation Study (2011)*, a high level assessment using windshield surveys and aerial imagery, and input provided by the public and City of Kingman staff. The approaches described below were developed based on findings gleaned from the review.

Sidewalk Improvements

This approach includes sidewalk construction and upgrades. Within the corridor focus area, sidewalk gaps were identified along the north-south routes of Western Avenue, Glen Road, and Burbank Street, and the east-west routes of Gordon Drive, Airway Avenue, Sycamore Avenue and Beverly Avenue. The installation of sidewalks in these locations would provide a more continuous network, furthering pedestrian mobility and offering alternatives to automobile travel for short trips. Completing facilities on the north-south routes of Western Avenue and Glen Avenue should be of particular importance, as they offer parallel routes to Stockton Hill Road. Table 3 and Figure 16 summarize the recommended sidewalk improvements.

Table 3: Sidewalk Improvements

Sidewalk Improvement	Location	Distance (mi)
Western Avenue	Airway Avenue to Sycamore Avenue	0.25
Glen Road	Airway Avenue to Kino Avenue	0.75
Burbank Street	Airway Avenue to Mohave Wash	0.50
Gordon Drive[2]	Stockton Hill Road to Bank Street	3.0
Airway Avenue	West of Western Avenue	0.50
Sycamore Avenue	West of Western Avenue	0.75
Beverly Avenue	West of Western Avenue	0.25

In addition to the actual sidewalk construction listed in Table 3, each sidewalk improvement is also recommended to incorporate several other amenities. These would include buffers between the new sidewalk and the street, which are preferably landscaped to provide additional separation, adequate pedestrian lighting in currently less developed areas, and audible pedestrian crossing signals at signalized intersections.

Bicycle Improvements

This approach includes bicycle improvements including the addition of bicycle lanes or the upgrading of an existing wide curb lane to a bicycle lane. A wide curb lane, which is considered a bicycle facility by the *Kingman Pedestrian and Bikeway Plan (2000)*, currently exists along Stockton Hill Road from Andy Devine Avenue to Gordon Road. The first step is to upgrade the space provided by the wide curb lane to a designated striped bicycle lane, and to extend the bicycle lane northward to Northern Avenue. Secondly, the addition of bicycle lanes is recommended for the north-south routes of Western Avenue, Glen Avenue, Burbank Street, and Harrison Street / Willow Road. Bicycle lanes are also recommended along the east-west routes of Gordon Drive, Airway Avenue, and Sycamore Road west of Stockton Hill Road. Table 4 and Figure 16 summarize the recommended bicycle improvements.

[2] Pedestrian improvements Gordon Drive from Stockton Hill Road to Bank Street are programmed for 2014 (KATS 2011)

Table 4: Bicycle Improvements

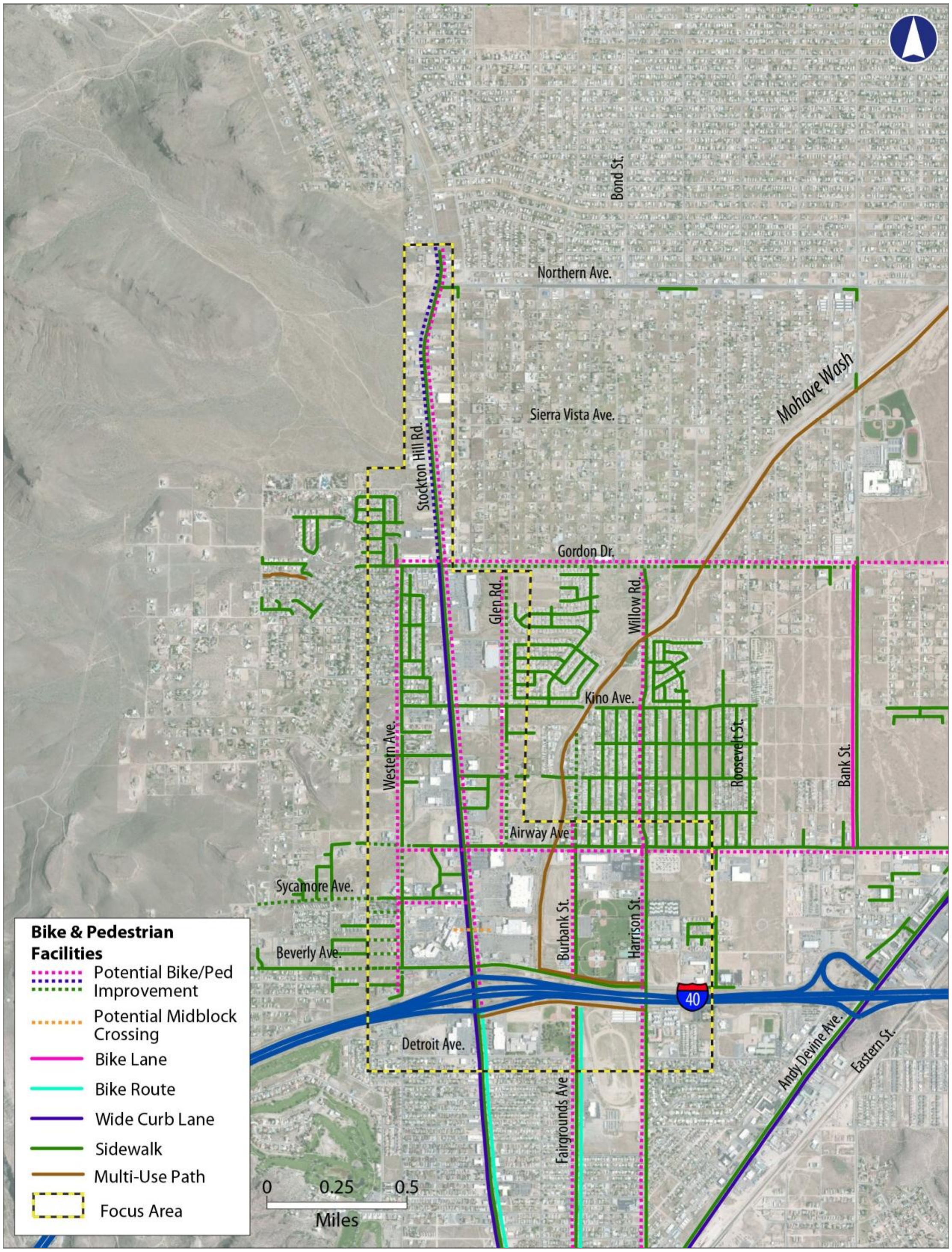
Bicycle Improvement	Location	Improvement Type	Distance (mi)
Stockton Hill Road	Detroit Avenue to Gordon Drive	Upgrade curb lane	3.5
Glen Road	Airway Avenue to Gordon Drive	Bicycle lane	1.0
Western Avenue	Beverly Avenue to Gordon Drive	Bicycle lane	3.0
Burbank Street	Beverly Avenue to Airway Avenue	Bicycle lane	1.0
Fairgrounds Avenue	Andy Devine Avenue to I-40	Bicycle lane	2.75
Harrison Street / Willow Road	Beverly Avenue to Gordon Drive	Bicycle lane	3.0
Harrison Street / Willow Road	Andy Devine Avenue to I-40	Bicycle lane	2.0
Gordon Drive[3]	Stockton Hill Road to Bank Street	Bicycle lane	3.0
Sycamore Avenue	Western Avenue to Stockton Hill Road	Bicycle lane	0.5
Airway Avenue	East of Western Avenue	Bicycle lane	4.0

Midblock Pedestrian Crossing

This approach includes the near term construction of a midblock pedestrian crossing spanning Stockton Hill Road between Sycamore Avenue and Beverly Avenue in the vicinity of the KRMC. The KRMC draws large volumes of foot traffic compared to many other destinations within the corridor, and has been particularly problematic in terms of pedestrians unsafely crossing at un-signalized locations resulting in increased automobile-pedestrian conflicts. Although the development of a corridor wide midblock crossing policy is recommended in Section 2.2.3, input from City of Kingman staff and stakeholders has prioritized this location for nearer term construction.

[3] Bicycle improvements from Stockton Hill Road to Bank Street are programmed for 2014 (KATS 2011)

Figure 16: Potential Multimodal Improvements



2.2. Development Framework Approaches

Development framework approaches were identified to enhance the visual quality and urban character of the Stockton Hill Road corridor. Rather than recommend specific technical solutions, these approaches suggest possible development, street network, and multimodal transportation policy changes. This strategy focuses more on the policy framework that affects the growth and evolution of the Stockton Hill Road corridor. The goal is to transition the corridor from one with automobile-dominated strip development to a more pedestrian-friendly area with more compact development and redundancy in the transportation network. These changes would create transportation and development opportunities. It is important to note that the following policy alternatives are not absolute and only intended to provide guidance to community stakeholders when creating a formal policy framework.

2.2.1. Development Policy

Policies that guide development, such as zoning ordinances, subdivision regulations, parking standards, and development review processes all play an influential role in determining the character of a corridor. Development policies also have a direct affect on automobile and multimodal mobility and access outcomes. The City of Kingman's current development polices within the corridor are catered towards automobile-oriented commercial uses in the form of strip malls and big-box retail developments. Existing parking, set-back, and access requirements are flexible, which leads to an overabundance of parking facilities with inconsistent property frontages set back far from the street.

The current development framework within the corridor diminishes the character and visual appeal of the built environment, discourages walking and bicycling, and contributes to increased automobile congestion and access issues. However, the development framework within the corridor could be augmented in order to prevent new development or redevelopment projects along the corridor from existing character, mobility, and access issues. Specifically, there are several strategies that the City of Kingman could implement through zoning ordinance or development review regulatory functions.

Zoning Ordinance

The following is a set of potential actions that could be integrated into the City of Kingman Zoning Ordinance within the Stockton Hill Road corridor to improve existing character, mobility, and access issues.

Frontage and Setback Requirements

Establishing targeted zones with higher lot frontage and dimensional requirements along Stockton Hill Road and major cross streets would allow for greater spacing between commercial and residential driveways. Zones with smaller lot frontages could then be permitted in areas with alternative access options from Stockton Hill Road, including parallel streets such as Western Avenue and Glen Road. More consistent setbacks located closer to the street, allowing parking in the rear, would improve the corridor's visual appeal and pedestrian experience, while accommodating similar mixed use land use types to those discussed in Section 2.2.1.

Corner Lot Sizes

Corner lot sizes are of particular importance at an intersection of two major roads. Corner clearance is the distance from an intersection to the nearest access connection. Corner clearance standards preserve traffic conditions at intersections and safe and convenient access to corner properties. Many commercial uses that prefer corner lots also prefer large land area or multiple access points, such as gas stations, pharmacies, or big-box retail stores. Adopting a policy for corner lots within the corridor that ensures an adequate lot size and appropriate corner clearance will protect the development potential and market value of corner properties, while preventing access and congestion problems.

Outparcel Access

Many commercial properties develop in a pattern with an anchor retail center set back from the street, and multiple smaller outparcels with separate commercial uses located closer to the street. If individual access points are provided for each outparcel and the principle retail center, the overabundance of curb cuts can increase congestion and circulation issues for automobiles and pedestrians. Local policies should require access to outparcels through an internalized circulation system. The development code can be used to require that adjacent development sites under the same ownership, or those consolidated for development, will be considered one property for the purposes of access regulation.

Overlay Zone

The use of an overlay ordinance for the Stockton Hill Road corridor is a particular regulatory tool that could be used to implement the development policies discussed previously. This overlay would be a supplemental set of development policies that would apply to projects within a specified distance of Stockton Hill Road, or within a designated district encompassing the corridor study area. Zones of this type can be designed to address the unique circumstances of the corridor while addressing access management problems. Specific standards could be included that address a variety of issues such as right-of-way preservation, limitations on new driveways, and driveway spacing standards.

Planned Development Zones

Planned Unit Development Zones or (PUD) is another widely used regulatory tool that could be used to implement additional development policies for the Stockton Hill Road corridor. A PUD is a designated zone, where particular development standards are relaxed, and individual site development characteristics are negotiated between the developer and the local government. This process involves a much more extensive site-plan review process, and provides considerable discretionary authority to the development review body. Most communities utilize PUD as a floating zone that may be applied to individual sites upon request. The City of Kingman Zoning Ordinance currently includes the Commercial Planned Development District (C-3PDD) zoning designation. City of Kingman staff could utilize the C-3PDD zone in targeted areas within the Stockton Hill Road corridor in order to apply special access and pedestrian/ bicycle amenity requirements, or to accommodate similar land use types to those discussed in Section 2.2.1.

Development Review

The following actions to improve corridor character, mobility, and access can take place during development review. These strategies are not formally adopted ordinances, but rather policy principles, programs, or design strategies that could be incentivized and encouraged by local government staff during the site plan review process.

Optimized Driveway Location and Access Design

The site plan review process itself offers opportunities to require changes to the site design and layout of developments in order to avoid access problems, insure adequate circulation, and provide amenities for pedestrians and bicyclists. Many times these goals can be achieved through site specific design strategies rather than through a regulatory approach.

Landscaped Buffers

Landscape buffers consist of native or decorative plantings that separate incompatible land uses. They have the potential to improve roadway aesthetics, defuse noise, protect sensitive land uses, and soften hard edges along parking lots, driveways, and highways. These buffers can create a more unified character and address safety concerns. Ideal locations for the use of buffers include near incompatible uses, abrupt barriers and infrastructure, and at and around major intersections.

Combined Access and Parking

As noted previously, many automobile and pedestrian access issues along the Stockton Hill Road corridor stem from an overabundance of parking and access points to commercial properties. Site plan reviewers could promote shared access points and parking facilities between adjacent properties in order to prevent these issues in new developments or as part of redevelopment.

One strategy would be to adopt a formal policy that offers incentives to developers in exchange for sharing driveways and parking with neighboring properties. For instance, a new development could be incentivized to negotiate shared access and parking with an existing adjacent property through relaxed minimum frontage and parking requirements, or a streamlined review process. Specific project improvements for the combination of existing access drives are detailed in Section 2.1.2.

Multiple shared parking strategies exist in other Arizona communities that can be adapted for the corridor parking policy. The Cities of Prescott[4] and Flagstaff,[5] Arizona for example, allow two or more uses with different peak parking periods to share the same spaces to meet their parking requirements. To increase shared parking opportunities, parking policies can allow for a greater distance between buildings and parking facilities. The City of Mesa,[6] Arizona for instance, allows shared facilities to be located 660 feet off-site. Another strategy to reduce the amount of parking spaces is to set a maximum for the number of required spaces. Mesa and Tempe[7] prohibit developments from having more than 125% of the minimum required spaces.

2.2.2. Street Network Policy

Modern commercial centers along major thoroughfares often evolve in strips, concentrating new activity centers and traffic generators in a linear pattern instead of distributing amongst an adequate local network of roads with the capacity to accommodate desired land development. This is apparent within the Stockton Hill Road corridor, where the majority of commercial development has occurred along Stockton Hill Road itself. Fragmented street networks force more traffic to use major roadways, even for short local trips, and can also impede emergency access and increase the length of automobile trips.

A network of secondary "backage" roads parallel to the principle thoroughfare, tertiary routes, and side streets improve the connectivity of the built environment and offset travel demand away from the principle road. Other benefits may include fewer automobile miles traveled, fewer access problems on major roadways, and greater opportunities for walking, bicycling, and transit use. The design of a local road network is not only crucial for access management and effective automobile, bicycle, and pedestrian circulation, but it is also a key component of community design that can improve visual quality and character.

Multiple strategies exist to convert a fragmented street network focused on a commercial thoroughfare into a more substantial road network in corridors with a previously existing principle commercial thoroughfare. More immediate strategies include targeting and reemphasizing existing secondary roads for new commercial developments, and ensuring that internal street systems within individual site development and subdivision proposals are designed to coordinate with the existing street layout. A longer term approach would be to plan for the construction of new local streets in strategic locations, building towards a complete grid street layout that allows for multiple alternative routes between two locations. The latter strategy could entail parcel reassembly and smaller block sizes.

[4] Shared Parking Standards from the City of Prescott Land Development Code (2011)
[5] Shared Parking Standards from the City of Flagstaff Zoning Code (2011)
[6] On-Site Parking Standards from the City of Mesa Zoning Ordinance (2011)
[7] Parking Standards from the City of Tempe Zoning & Development Code (2006)

Preliminary Network Concept

The following describes a preliminary network concept for the Stockton Hill Road corridor that can be used to guide network policy development. This strategy represents one potential network concept that has not been fully evaluated, although it reflects input received to date from the public, stakeholders, and TAC. In order to implement a street network strategy within the corridor, community stakeholders must first complete a detailed network plan to identify specific goals and desired outcomes for the corridor.

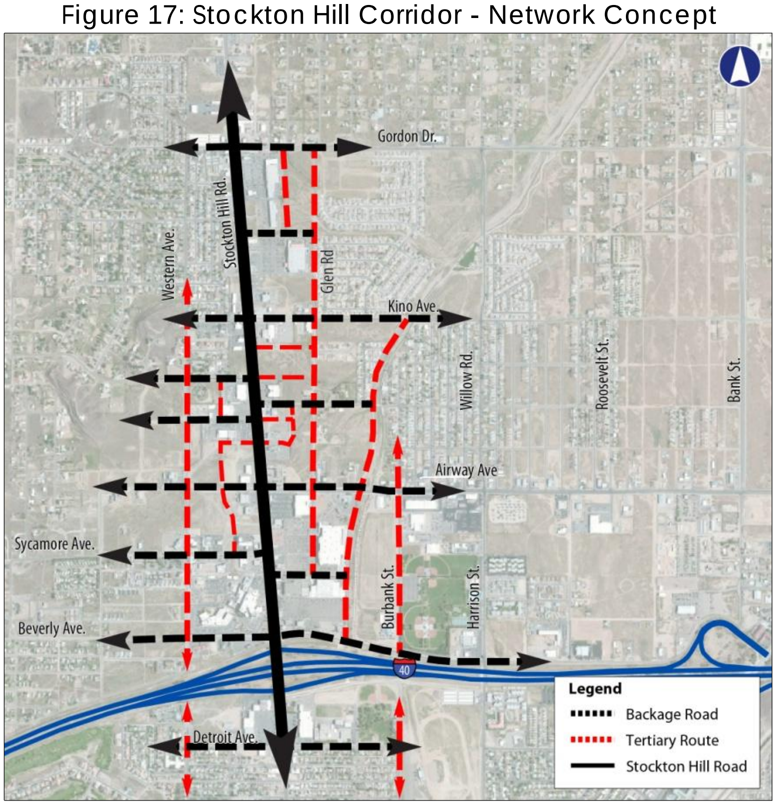
Western Avenue and Glen Road

Western Avenue and Glen Road already exist as parallel routes to Stockton Hill Road within close proximity to major concentrations of commercial uses. An immediate strategy would be for development staff to target planned developments along those streets within existing commercial zones, and emphasize those locations to developers.

"Backage" Roads and Tertiary Routes

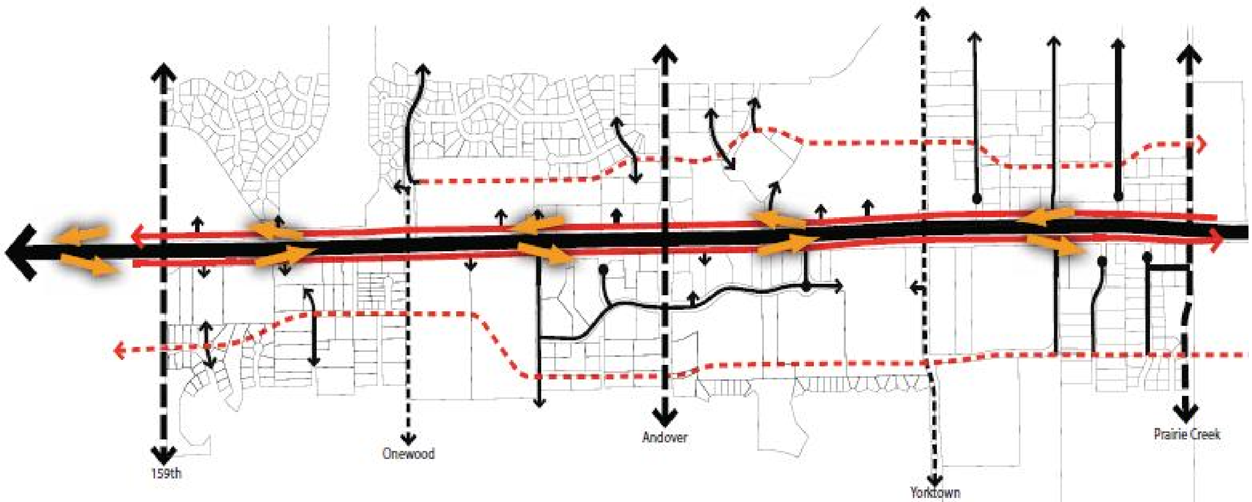
Over the long term, additional "backage roads" and tertiary routes could be identified and developed in order to create a grid street pattern. Figure 17 below shows one possible concept, involving extending Glen Road to the south, and reassembling several parcels between Kino Avenue and Sycamore Avenue to create new collector streets.

Figure 17: Stockton Hill Corridor - Network Concept



The development of a fully connected grid street network would require the creation of new collector streets, or the extension of existing collector streets secondary to Stockton Hill Road itself. This process is complex and can require parcel assembly, reassembly, or public acquisition of land. Figure 18 shows an example of a network concept adopted by the City of Andover Kansas. In this scenario, new collector streets were targeted mostly along existing lot lines. The City of Andover established a policy whereby right-of-way property adjacent to identified collector routes was obtained through exaction or purchased outright from property owners over time. Parcels requiring reassembly were also purchased individually by the City over the long term, reassembled and then reintroduced into the private market.

Figure 18: Andover Kansas - Network Concept



2.2.3. Multimodal Policy

A strategic policy for multimodal mobility is crucial in promoting a sustainable, pedestrian- and bicycle-friendly environment. Development in the Stockton Hill Road corridor, however, has been centered on automobiles while the needs of pedestrians and bicyclists have been given lesser priority. Existing pedestrian and bicycle facilities are limited and disconnected within the focus area, lacking an adequate network of sidewalks, bicycle lanes, bicycle parking, and midblock crossings. The *Kingman Pedestrian and Bikeway Plan (2000)* identified the Stockton Hill Road corridor as a specific area in need of additional pedestrian and bikeway improvements.

The Stockton Hill Road corridor houses many key commercial and medical destinations. Due to its clustering of services and increasing residential and employment densities, the corridor experiences severe congestion and could benefit from multimodal improvements. High capacity automobile corridors such as Stockton Hill Road can alleviate traffic congestion and improve traffic flow by encouraging alternative modes of transportation. Well-designed pedestrian and bicycle facilities integrated with nearby land uses have the potential to provide social, economic, environmental, and aesthetic benefits to the overall community.

The following approaches represent policies for pedestrian and bicycle amenities that would help to address multimodal safety and access concerns within the corridor. These should serve as a basis for the formation of a strategic policy for the provision of non-motorized facilities within the corridor.

Midblock Crossings

Midblock crossings provide designated pathways for pedestrians to travel across busy roadways at locations other than signalized intersections. They are essential along corridors with few or far apart intersections. Stockton Hill Road, however, lacks east-west midblock crossings. Because many accessible crossing points are not clearly identified or accessible, pedestrians often unsafely cross at unmarked locations resulting in increased automobile-pedestrian conflicts. The addition of safe, visible, and evenly distributed midblock crossings on Stockton Hill Road could reduce conflicts and promote a safer environment, particularly in the vicinity of the KRMC, which is identified as a specific improvement project in Section 2.1.4. To implement midblock crossings, elements could be integrated into the non-motorized policy to identify strategic problem areas for targeted investments, followed by a longer term strategy of including midblock crossings as part of future roadway projects.

Bicycle Parking

Adding secure bicycle parking facilities to commercial parking lots along Stockton Hill Road would encourage bicycling throughout the corridor. Local zoning ordinances should have provisions for bicycle parking facilities to be located in a safe, convenient, and clearly designated location. Bicycle parking facilities could encourage bicyclists to lock their bicycles. Ideal locations for bicycle parking would be located nearby store entrances, away from pedestrian walkways and automobile traffic.

Currently, the City of Kingman Zoning Ordinance requires commercial uses to have bicycle parking spaces equal to five percent of the required automobile parking spaces, with a minimum of two bicycle parking spaces. One strategy to make bicycling more desirable is to simply increase the standard number of bicycle parking spaces required. Gilbert, Arizona, for example, requires all land uses to have one bicycle space per every ten required automobile space. For uses with less than 40 automobile spaces, the bicycle requirement is still four spaces. A similar requirement can be adapted to the City of Kingman’s bicycle parking policy.

Sidewalk Improvements

At the most basic level, a complete network of sidewalks is needed to connect pedestrian and bicyclists to their destinations. Within the focus area, several sidewalks are disconnected, missing, or too narrow. The installation of adequate sidewalks in these locations would provide a continuous network, furthering pedestrian mobility and enhancing corridor aesthetics. A targeted sidewalk policy should be developed to separate pedestrians from the roadway, allow American with Disabilities Act (ADA) accessibility, encourage pedestrian activity, and improve pedestrian safety. One method would be to incorporate sidewalk improvements as a part of future roadway projects where feasible. Sidewalks should be separated by a landscaped buffer, clearly differentiated from parking lots and roadways, include adequate pedestrian crossing signals, preferably audible, and insure facilities are up to ADA standards.

Bicycle Lane Improvements

Bicycle lanes are typically one-way bicycle facilities on arterial and collector streets. They are located adjacent to motor automobile traffic and designated for cyclists by striping, signage, and pavement marking. Currently, the Stockton Hill Road corridor lacks bicycle lanes, thereby discouraging bicycling and making cyclists more susceptible to collisions. Bicycle lanes serve to reduce conflict between cyclists and motorists by separating the two users and making travel movements more predictable. Bicycle lanes located on busy arterial and collector streets could help minimize this conflict. One strategy to introduce a bicycle lane policy would be to include bicycle lane provisions in future roadway projects.

Transit Amenities

Improvements to amenities serving transit riders can complement other multi modal policies, and further bicyclist and pedestrian mobility goals within a corridor. For instance, improved furniture, shading, and shelters at transit stops can encourage increased pedestrian travel, and bus mounted bicycle racks can result in greater bicycle mobility. Kingman Area Regional Transit vehicles (KART) are currently equipped with front mounted bicycle racks to serve bicyclists. However, several bus stops within the study area lack amenities such as benches, adequate shading, or shelters. The upgrading of bus stop bus stop amenities within the corridor could result in greater pedestrian mobility and increased transit ridership, without necessarily augmenting KART service routes or schedules. One element of a comprehensive non-motorized policy could be to include bus stop upgrades as part of future roadway projects.

The multimodal policy strategies described above can be used as a guide for non-motorized development in the Stockton Hill Road corridor. These approaches are intended to encourage pedestrian and bicycle activity in the Stockton Hill Road corridor and can be included as corridor specific elements in an update to the *Kingman Bicycle and Pedestrian Plan (2000).*

3.0 EVALUATION OF PRELIMINARY IMPROVEMENT APPROACHES

An evaluation of the preliminary improvement approaches is essential in identifying the potential benefits, impacts, and constraints of each improvement. To do so, evaluation criteria were developed with input from stakeholders and the public, who shared a vision of enhancing the corridor and creating a safe, efficient, and economically feasible transportation network. The evaluation process is based on both qualitative and quantitative assessments established by the criteria listed in Section 3.1, and agreed upon by TAC members. Mobility and development framework recommendations are evaluated separately in Section 3.2 to determine how well each improvement addresses the identified deficiencies and goals of the corridor study.

3.1. Evaluation Criteria and Methodology

The evaluation criteria listed below was used to evaluate the specific approaches of each general category. Evaluations will consist of both quantitative and qualitative approaches. Qualitative evaluations will be ranked by categorical values (good, fair, and poor). Quantitative evaluations will be ranked numerically, when possible, or by higher level comparative costs ($, $$, $$$).

The preliminary improvement approaches evaluated as part of this project covered a wide range of solutions, both technical and policy based. Because of the varying range of solutions introduced, and in order to ensure a transparent and clear evaluation of approaches, individual criteria were not weighted against each other. In addition, the elements included within each improvement approach were kept separate throughout the evaluation and implementation discussions contained in Section 3.0 and Section 4.0.

3.1.1. Improvement Cost

The improvement cost is an estimate of the total capital project costs of each improvement. This includes construction and estimated right-of-way costs, but not maintenance, operation, or planning costs. Where possible, ranges of dollar values were calculated based on comparable unit costs.

Improvements will be ranked as follows:

- $$$: High cost
- $$: Medium cost
- $: Low cost

3.1.2. Right-of-Way Impact

Public projects often require the acquisition of private property by the responsible public entity. The right-of-way (ROW) impact is a qualitative measure of the magnitude of right-of-way acquisition required for each improvement.

Impacts will be ranked as follows:

- Poor: Substantial ROW impact; project encroaches on a relatively significant amount of private property.
- Fair: Limited ROW impacts; project encroaches on some amount of private property.
- Good: No ROW impacts; project does not encroach on private property.

3.1.3. Funding Availability

Funding availability is a qualitative measure of funding sources, including grants and local funding opportunities, available for each improvement. This will help determine the financial feasibility of each improvement.

Improvements will be ranked as follows:

- Poor: Low funding likelihood; no potential sources available.
- Fair: Fair funding likelihood; some potential sources available.
- Good: High funding potential; realistic funding sources identified.

3.1.4. Safety Improvement

Safety improvement is a measure of the potential safety issues associated with each improvement. This includes the safety of drivers, pedestrians, and bicyclists. Rankings will be assessed based on whether the improvement can be expected to have a positive, neutral, or negative impact on safety.

Improvements will be ranked as follows:

- Poor: Improvement includes elements which can detract from the safety of one or more travel modes.
- Fair: Limited or neutral safety impact; improvement expected to have little to no impact on safety for any travel mode.
- Good: Positive safety impact; improvement Includes substantial traffic calming or conflict prevention elements, or evaluation of the improvement using the FHWA safety evaluation tool for crash-reduction-factors (CRF) resulted in a positive score.

3.1.5. Automobile Mobility

Automobile mobility is a measure of how well each improvement reduces automobile congestion and increases automobile connectivity within the transportation network. Automobile mobility will be assessed based on the improvement's potential impact on congestion (measured by both LOS and connectivity).

Improvements will be ranked as follows:

- Poor: Improvement results in a reduction in LOS and connectivity.
- Fair: Improvement increases LOS and reduces connectivity or vice versa; or the Improvement has little to no impact on LOS and connectivity.
- Good: Improvement results in an increase in LOS and connectivity.

3.1.6. Pedestrian Mobility

Pedestrian mobility is a measure of how well each project improves the conditions for walking within the corridor. Pedestrian mobility will be assessed based on the impact on pedestrian mobility, as well as the inclusion of specific facilities such as sidewalks, crosswalks, or other pedestrian amenities.

Improvements will be ranked as follows:

- Poor: Improvement could potentially reduce pedestrian mobility, and no specific pedestrian facilities are included.
- Fair: Improvement expected to have little to no effect on pedestrian mobility, and no specific pedestrian facilities are included.
- Good: Improvement expected to increase pedestrian mobility, or specific pedestrian elements are included.

3.1.7. Bicycle Mobility

Bicycle mobility is a qualitative measure of how well each project improves the conditions for bicycling within the corridor. Bicycle mobility will be assessed based on the impact on pedestrian connectivity, as well as the inclusion of specific facilities such as bicycle lanes, bicycle routes, or wide curb lanes.

Improvements will be ranked as follows:

- Poor: Improvement could potentially reduce bicycle mobility, and no specific bicycle facilities are included.
- Fair: Improvement expected to have little to no effect on bicycle mobility, and no specific bicycle facilities are included.
- Good: Improvement expected to increase bicycle mobility, or specific bicycle elements are included.

3.1.8. Environmental Impact

Environmental impact is a qualitative measure of the potential impact that each improvement has on the environment. This includes near term physical impacts on the natural environment, wildlife, and adjacent properties. Environmental impacts due to the construction, operations, and maintenance of the improvement will also be taken into consideration.

Improvements will be ranked as follows:

- Poor: Potential negative impact to the environment.
- Fair: Minimal impact to the environment.
- Good: No impact to the environment.

3.1.9. Visual Quality

Visual quality is a qualitative measure of the aesthetic value of each improvement. Visual quality will be assessed based on the level of aesthetic impact or aesthetic potential each improvement would have on either adjacent properties or the corridor as a whole.

Improvements will be ranked as follows:

- Poor: Potential for negative aesthetic impact on adjacent properties and overall corridor.
- Fair: Little to no aesthetic impact on adjacent properties and overall corridor.
- Good: Positive aesthetic impact to adjacent properties and overall corridor.

3.1.10. Public Acceptance

Public acceptance is a measure of the level of support each improvement or strategy would have from community stakeholders and the general public. Levels of public acceptance for each alternative will be assessed based on input gleaned from stakeholder interviews, open house meetings, public comments, and typical public reactions from comparable improvements in other similar corridors.

Improvements will be ranked as follows:

- Poor: Little to no public acceptance expected.
- Fair: Moderate public acceptance expected.
- Good: Significant public acceptance expected.

3.1.11. City Support

City support is a qualitative measure of the level of potential acceptance each improvement would have from the TAC and City officials. City support will be assessed based on input from TAC meetings and correspondence directly from TAC members.

Improvements will be ranked as follows:

- Poor: Little to no City support expected.
- Fair: Moderate City support expected.
- Good: Significant City support expected.

3.2. Evaluation of Approaches

The following section describes the evaluation of the preliminary improvement approaches discussed in Section 2.0. Each improvement approach was screened against the accepted evaluation criteria described in Section 3.1. Although both quantitative and qualitative criteria were utilized, the evaluation of mobility approaches was more technical in nature, as described in Section 3.2.1, while the evaluation of development framework approaches was less technical.

3.2.1. Mobility Approaches

The following section describes the evaluation of the mobility approaches discussed in Section 2.1, including Traffic Operations, Access Control, Beverly Intersection Improvements, and Non-motorized Improvements.

3.2.1.1. Traffic Operations

The preliminary traffic operations improvements were evaluated using the software SYNCHRO to see if improvements to segment travel times and LOS could be realized. A screening level analysis was completed to identify operational improvements, assuming a base year of 2013. The benefits from using technological enhancements to ensure optimal performance of the signal system was evaluated using the ITS Benefits Database hosted by the US Department of Transportation (USDOT), ITS Joint Program Office (www.itsbenefits.its.dot.gov).

Traffic Signal Timing and Synchronization

The traffic signal timings for the existing AM, Midday, and PM peak periods were optimized. A cycle length of 120 seconds was used for all intersections in the three strategies explained in Working Paper No. 1. No changes to phasing or lead-lag optimization for signalized left turns were done. Table 5 and Table 6 present the segment LOS for the northbound and southbound corridors for the existing and the optimized signal timings. Table 7 and Table 8 present the segment speeds for both cases. Even this simple optimization effort results in a slight increase in corridor travel speeds in most cases. It should be noted that a full re-optimization effort will involve several additional tasks including evaluating various cycle lengths, phase sequencing, timing parameters, and model calibration using travel time runs and manual fine tuning of signal timings.

Although overall corridor LOS and speeds were shown to improve after signal optimization, the analysis revealed some challenging segments where the optimized LOS or speed was shown to decline compared to existing. In particular, the split phasing of the eastbound and westbound phases for the intersection of Stockton Hill Road with Airway Avenue was shown to be particularly problematic. This demonstrates the limitations of implementing signal optimization alone. The greatest benefits to traffic flow within the corridor would result from additional complementary approaches such as an ITS program.

Table 5: LOS for Northbound Stockton Hill Road Segments.

Segment - Stockton Hill Road NB	LOS*								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	E	D	+	D	C	+	C	C	
I-40 EB - I-40 WB	C	C		C	C		C	C	
I-40 WB - KRMC	C	C		D	C	+	D	B	+
KRMC - Sycamore	D	C	+	D	C	+	D	D	
Sycamore - Airway	E	E		E	F	-	E	F	-
Airway - Kino	B	B		B	B		B	B	
Kino - Home Depot	B	B		C	C		B	B	
Home Depot - Gordon	B	B		B	B		B	B	
Gordon - Northern	A	A		A	A		A	A	
Corridor	C	B	+	C	C		C	C	

Segment LOS measures include +/- if applicable

Table 6: LOS for Southbound Stockton Hill Road Segments

Segment - Stockton Hill Road NB	LOS*								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	A	A		A	A		A	A	
I-40 EB - I-40 WB	B	B		B	B		B	B	
I-40 WB - KRMC	B	B		C	C		B	B	
KRMC - Sycamore	C	C		C	C		C	C	
Sycamore - Airway	C	B	+	C	B	+	C	B	+
Airway - Kino	C	B	+	D	C	+	C	D	-
Kino - Home Depot	C	C		C	D	-	D	C	+
Home Depot - Gordon	B	B		B	B		B	B	
Gordon - Northern	C	C		B	B		C	B	+
Corridor	B	B		B	B		B	B	

Segment LOS measures include +/- if applicable

Table 7: Speed for Northbound Stockton Hill Road Segments

Segment - Stockton Hill Road NB	SPEED* (MPH)								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	12.7	14.5	+	17	18	+	18.1	18.7	+
I-40 EB - I-40 WB	18.3	18	-	20.7	20.7		21.7	21.6	-
I-40 WB - KRMC	21.6	19.3	-	16.8	21.1	+	17	24	+
KRMC - Sycamore	14.1	22.6	+	14.8	20.5	+	16.9	16.6	-
Sycamore - Airway	13.5	12.8	-	10.7	9.6	-	13.8	9	-
Airway - Kino	25.7	29.4	+	27.9	29.6	+	24.7	29.6	+
Kino - Home Depot	26.2	25.5	-	18.9	23.6	+	25.8	24.7	-
Home Depot - Gordon	28.3	28.5	+	26.5	28.9	+	27.2	28	+
Gordon - Northern	34	33.8	-	33.8	34.3	+	33.4	34.5	+
Corridor	23.1	24.3	+	22.6	23.8	+	23.5	23.5	

**Segment speed measures include +/- if applicable*

Table 8: Speed for Southbound Stockton Hill Road Segments

Segment - Stockton Hill Road NB	SPEED* (MPH)								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	32.4	32.4		32	33.7	+	31.6	32.6	+
I-40 EB - I-40 WB	24.5	27.6	+	24.8	24.6	-	25.3	26.1	+
I-40 WB - KRMC	24.2	24.4	+	19.7	23.5	+	24.5	24.5	
KRMC - Sycamore	21.7	20.8	-	20.7	21.1	+	22.2	20.3	-
Sycamore - Airway	23.8	24.9	+	21.6	26.9	+	20.1	25.2	+
Airway - Kino	23.9	25.2	+	17.2	20.5	+	19.7	15.5	-
Kino - Home Depot	19.8	20.2	+	19.4	14.5	-	14.2	19.6	+
Home Depot - Gordon	24.4	24.4		24.9	24.9		25.1	25.1	
Gordon - Northern	23.3	18.5	-	25	25.6	+	20.3	25.3	+
Corridor	25.4	25.3	-	24.4	25.1	+	24.1	24.9	+

**Segment speed measures include +/- if applicable*

Intelligent Transportation Systems

ITS provides a very high benefit to cost ratio. Table 9 provides the benefits reported by agencies in the United States which implemented the ITS alternatives presented in this report. Implementation of its techniques beyond the previously discussed signal optimization would yield greater common improvements beyond those shown in Table 5 through Table 8.

Table 9: Benefits from Arterial ITS improvements

ITS Technology	Benefits
Signal Coordination	Virginia: Coordinated Actuated traffic signal systems produced a 30 percent reduction in Corridor travel times compared to actuated isolated systems, resulting in benefit-cost ratio of 461:1
Signal Coordination	Pennsylvania: An optimized traffic signal timing project in Alleghany County, PA resulted in a benefit -cost ratio of 57:1 along the corridor
Traffic Management System	New Mexico: In Espana, New Mexico the implementation of a traffic management system on NM 68 provided a decrease in total crashes of 27.5 percent
Traffic Management System	Colorado: In the City of Fort Collins, Colorado, the installation of an advanced Traffic management System reduced travel times up to 36 percent.
Adaptive Signal Control	Colorado: Installation of adaptive signal control systems on two corridors in Colorado improved travel times by 9 to 19 percent, increased average speed by 7 to 22 percent and maintained or improved LOS at the studied intersections
Source: www.itsbenefits.its.dot.gov *US Department of Transportation, Research and Innovative Technology Administration (2013)*	

Vehicular Capacity Improvements

The capacity improvement measures described in Section 2.1.1.3 involving the addition of right turn lanes at intersections and driveways were also evaluated. However, these measures did not result in any improvement in segment LOS or speeds based on VISSIM modeling, indicating their limitation to improve vehicular circulation in the near term without other complimentary improvements. In this way, vehicular capacity improvements may not meet the immediate purpose and need of the corridor study.

Table 10 provides a qualitative comparison of the various traffic operations improvement alternatives considered.

Table 10: Evaluation of Traffic Operations Alternatives

Criteria	Traffic Operations Alternatives				
	Signal Optimization	ITS: GPS/Interconnect	ITS: Central System	ITS: Adaptive System	Vehicular Capacity Improvements
Improvement Cost	$	$	$$	$$	$$$
ROW Impact	Good	Good	Good	Good	Fair
Funding Availability	Good	Good	Good	Good	Fair
Safety Impact	Good	Good	Good	Good	Good
Automobile Mobility	Good	Good	Good	Good	Fair
Pedestrian Mobility	Fair	N/A	N/A	N/A	Fair
Bicycle Mobility	Fair	N/A	N/A	N/A	Poor
Environmental Impact	Good	Fair	Fair	Fair	Fair
Visual Quality	N/A	N/A	N/A	N/A	Good

3.2.1.2. Access Control

The access control solutions discussed in Section 3.2.1.2 were evaluated based on the criteria described in Section 3.1, shown in Table 12. They are categorized into three areas: Driveway Closure/Combination, Parcel Thru Access, and Raised Median/Channelization. The solution methods were evaluated as a whole, not by specific location along the corridor.

The improvement cost was determined using planning-level estimates of a typical application. Since the cost for each location will vary depending on surrounding factors, an average cost of the typical application was used. Major items associated with the work were estimated. These items include; removal of existing sidewalk/driveway, installation of new edge of roadway treatment such as pavement, curb, gutter, or sidewalk, additional drainage provisions, traffic control, right-of-way acquisition, and contingency.

Table 11 shows the assumed unit prices for these improvements, based on recent construction bid costs. These prices assumed 2013 costs and were not inflated to accommodate the costs in a particular construction year, as the implementation year of each location number may vary. The cost of right-of-way is extremely variable due to the changing economic conditions and changing land values. The assumed right-of-way cost was based on historic purchases in the region and is meant to be used as a comparison value only.

Table 11: Access Control Estimate Unit Costs

Item	Unit	Unit Cost
Remove Sidewalk/Driveway	SF	$3
Remove Curb/Gutter	LF	$5
Remove Pavement	SF	$3
New Pavement	SF	$6
New Sidewalk	SF	$5
New Curb/Gutter	LF	$15
Site Grading	SF	$5
Traffic Control	-	25%
Contingency	-	10%
Design/Construction Engineering	-	10%
Right-of-way/Easement	SF	$2

Source: ADOT E2C2 Historical Price Index (Accessed July 2013)

Right-of-way impacts were evaluated based on whether additional acquisition would be required, on average, or if an access permit/easement would be required to construct the improvements.

Funding availability was evaluated by comparing the planning-level cost estimate of the improvement with funding sources available for that improvement. The driveway, parcel thru-access, and median improvements are lower-cost measures that can be implemented for minimal cost.

The three alternatives were evaluated to determine the safety of automobiles and other road users such as bicyclists and pedestrians. If navigation would be impacted negatively, the item was rated “Poor.” Also, using the FHWA safety evaluation tool for crash-reduction-factors (CRF) for implementing typical countermeasures, the three alternatives were evaluated on their ability to reduce crashes at their respective locations along the corridor. If the CRF for the improvement was a positive value, the item was rated “Good”.

Automobile mobility for all three access control solutions would be increased with implementation of these improvements along the Stockton Hill Road corridor. Reduction in the overall number of driveways along the corridor will reduce the amount of side friction experienced by the thru traffic movement on Stockton Hill Road. Providing raised medians allows for greater free-flow along the corridor and focuses left-turning movements to only designated channelization locations or at signalized intersections.

Public feedback received regarding driveway closure or consolidation and raised medians has been generally favorable. Feedback concerning parcel through access has been mixed, as some stakeholders showed concern with the required coordination between property owners. Discussions with City of Kingman staff have indicated some level of support for all three access control solutions. However, additional feedback will be collected at the next public meeting and incorporated into the final report.

Table 12: Evaluation of Access Control Solutions Alternative

Criteria	Access Control Solutions Alternative		
	Driveway Closure/Combination	Parcel Thru Access	Raised Medians / Channelization
Improvement Cost	$	$$	$$
ROW Impact	Good	Poor	Good
Funding Availability	Good	Poor	Good
Safety Impact	Good	Good	Good
Automobile Mobility	Good	Good	Good
Pedestrian Mobility	Good	Good	Good
Bicycle Mobility	Good	Good	Good
Environmental Impact	Fair	Fair	Good
Visual Quality	Fair	Fair	Fair
Public Acceptance	Good	Fair	Good
City Support	Good	Good	Good

3.2.1.3. *Beverly Intersection Improvements*

The Beverly Avenue intersection alternatives discussed in the previous section were evaluated independently, based on the criteria in section 3.1. The evaluation is shown in Table 14.

The improvement cost was determined using planning-level estimates prepared for each alternative. Major items associated with the work were estimated. These items include; roadway reconstruction, drainage provisions, design/construction engineering, right-of-way acquisition and contingency. Familiar items under roadway reconstruction include pavement, curb and gutter, sidewalk, and earthwork. Other items under roadway construction include traffic elements such as striping, lighting and traffic control.

Table 13 shows the assumed unit prices for the Beverly Avenue alternatives, based on recent construction bid costs. These prices were not inflated to accommodate the costs in a particular construction year. The cost of right-of-way is extremely variable due to the changing economic conditions and changing land values. The assumed right-of-way cost was based on historic purchases in the region and is meant to be used as a comparison value only.

Table 13: Beverly Avenue Alternatives Estimate Unit Costs

Item	Unit	Unit Cost
Remove Traffic Signal	EA	$5,000
Remove Sidewalk & Pavement	SF	$3
Remove Curb/Gutter	LF	$5
New Pavement	SF	$6
New Median Pavement	SF	$5
New Sidewalk	SF	$5
New Curb/Gutter	LF	$15
Site Grading	SF	$5
New Traffic Appurtenances	LF	$5
Traffic Control	-	25%
Contingency	-	10%
Design/Construction Engineering	-	10%
Right-of-way/Easement	SF	$2

Source: ADOT E2C2 Historical Price Index (Accessed July 2013)

Right-of-way impacts were evaluated based on whether additional acquisition would be required, or if an access permit/easement would be required to construct the improvements.

Funding availability was evaluated by comparing the planning-level cost estimate of the improvement with funding sources available for that improvement. The Beverly alternatives are solutions that are implemented at a higher cost.

The two alternatives were evaluated to determine the safety of automobiles and other road users such as bicyclists and pedestrians, as they would navigate the proposed alternatives. If navigation would be impacted negatively, the item was rated “Poor.” Also, using the FHWA safety evaluation tool for crash-reduction-factors (CRF) for implementing typical countermeasures, the two alternatives were evaluated on their ability to reduce crashes at the Beverly Avenue/Stockton Hill Road intersection. If the CRF for the intersection improvement was a positive value, the item was rated “Good”.

Automobile mobility for both Beverly alternatives would be increased with implementation of these concepts. Both alternatives would allow all movements at the Beverly Avenue/Stockton Hill Road intersection.

Public feedback received regarding both alternatives has been mixed, with different opinions on which option would be most successful. Ongoing discussions with the TAC have indicated some initial support for the elongated roundabout, which is also the preferred option of the regional ADOT district office. However, additional feedback will be collected at the next TAC meeting and incorporated into the final report. In addition, an initial simulation using VISSUM software

Table 14: Evaluation of Beverly Avenue Improvements

Criteria	Beverly Avenue Improvements	
	Elongated Roundabout	J-Hook
Improvement Cost	$$$	$$
ROW Impact	Poor	Fair
Funding Availability	Poor	Fair
Safety Impact	Fair	Good
Automobile Mobility	Good	Good
Pedestrian Mobility	Poor	Fair
Bicycle Mobility	Poor	Fair
Environmental Impact	Fair	Fair
Visual Quality	Fair	Fair
Public Acceptance	Fair	Fair
City Support	Good	Fair

Source: ADOT E2C2 Historical Price Index

3.2.1.4. Non-motorized Improvements

The specific projects included in the non-motorized improvements of sidewalks, bicycle facilities, and midblock crossings are detailed in Section 2.1.4, and were screened against the evaluation criteria detailed in Section 3.1. The evaluation considered all improvements included in each approach. The evaluation results are shown in Table 16.

Improvement costs were determined using planning-level estimates on a per mile basis for the addition of sidewalks and bicycle facilities. Table 15 shows an estimated range of costs for each improvement, based on comparable improvements included in the *Kingman Area Transportation Study (2011).* Given the variability in the range of values associated with each improvement, costs were not inflated to represent construction year dollars.

Table 15: Non-motorized Improvements Estimate Costs

Item	Unit	Cost
Sidewalk Addition	Per mile	$250k-$500k
Bicycle Facility Addition	Per mile	$100k-$500k

Source: Kingman Area Transportation Study (KATS) 2011

The impact on ROW for sidewalk and bicycle lane additions was determined to be substantial, as both would most likely require additional ROW, while the upgrading of an existing wide curb lane and addition of midblock crossing would not require additional ROW. It was also determined that there would be a fair likelihood of funding availability for all strategies.

Sidewalk additions and midblock crossings could be expected to have a positive impact on pedestrian mobility and only limited effect on bicycle and automobile mobility. The bicycle facilities would have a similar impact on mobility, benefitting bicyclists greatly with only a limited impact on automobiles and pedestrians. All improvements would also have moderate environmental and visual quality impacts.

In terms of public acceptance and City support, it is assumed the sidewalk additions and midblock crossing would be generally supported by both City representatives and the public. Bicycle facility additions could be more difficult, as public feedback received has not represented the same level of support compared to the other approaches.

Table 16: Evaluation of Non-motorized Improvements

Criteria	Non-motorized Improvements			
	Sidewalk Addition	Bicycle Lane Addition	Upgrade wide curb lane	Midblock Crossing
Improvement Cost	$$	$$$	$	$
ROW Impact	Poor	Poor	Good	Good
Funding Availability	Fair	Fair	Fair	Fair
Safety Impact	Good	Good	Good	Good
Automobile Mobility	Fair	Fair	Fair	Fair
Pedestrian Mobility	Good	Fair	Fair	Good
Bicycle Mobility	Fair	Good	Good	Fair
Environmental Impact	Fair	Fair	Fair	Fair
Visual Quality	Fair	Fair	Fair	Fair
Public Acceptance	Good	Fair	Fair	Good
City Support	Good	Fair	Fair	Good

3.2.2. Development Framework Alternatives

The following section describes the evaluation of the Development Framework Alternatives discussed in Section 2.2, including Development Policy, Street Network Policy, and Multimodal Policy.

3.2.2.1. Development Policy

The specific strategies included in the development policy alternative, discussed in Section 2.2.1, were evaluated independently using the criteria in Section 3.1. Table 17 and Table 18 show the evaluation results of the Zoning Ordinance and Development Review strategies, respectively.

<u>Zoning Ordinance</u>

Frontage requirements, corner lot sizes, and outparcel access were determined to result in positive safety and mobility impacts due to their potential to reduce conflicts and improve circulation, while setback requirements would be expected to have little to no effect on the same factors. Overall visual quality would be expected to improve after the adoption of frontage and setback requirements, however corner lot sizes and outparcel access would have a neutral impact.

Table 17: Evaluation of Development Policy Alternatives – Zoning Ordinance

Criteria	Development Policy Alternatives: Zoning Ordinance			
	Frontage Requirements	Setback Requirements	Corner Lot Sizes	Outparcel Access
Improvement Cost	N/A	N/A	N/A	N/A
ROW Impact	N/A	N/A	N/A	N/A
Funding Availability	N/A	N/A	N/A	N/A
Safety Impact	Good	Fair	Good	Good
Automobile Mobility	Good	Fair	Good	Good
Pedestrian Mobility	Good	Fair	Good	Good
Bicycle Mobility	Good	Fair	Good	Good
Environmental Impact	N/A	N/A	N/A	N/A
Visual Quality	Good	Good	Fair	Fair
Public Acceptance	Good	Good	Good	Good
City Support	Fair	Fair	Fair	Fair

Development Review

Optimized access design, shared access, and shared parking were also determined to result in improved safety and mobility due to conflict reduction and better circulation. Landscape buffers, on the other hand, would be expected to have a positive impact on safety, but little to no effect on mobility.

Table 18: Evaluation of Development Policy Alternatives – Development Review

Criteria	Development Policy Alternatives: Development Review			
	Optimized Access Design	Shared Access	Shared Parking	Landscape Buffers
Improvement Cost	N/A	N/A	N/A	N/A
ROW Impact	N/A	N/A	N/A	N/A
Funding Availability	N/A	N/A	N/A	N/A
Safety Impact	Good	Good	Good	Good
Automobile Mobility	Good	Good	Good	Fair
Pedestrian Mobility	Good	Good	Good	Fair
Bicycle Mobility	Good	Good	Good	Fair
Environmental Impact	N/A	N/A	N/A	N/A
Visual Quality	Good	Good	Good	Good
Public Acceptance	Good	Good	Good	Good
City Support	Fair	Fair	Fair	Fair

All the included alternatives were determined to be generally accepted by the public, as they would result in improved access and ease of movement over the long term. This was based on input gleaned from stakeholder interviews and public meetings. The same alternatives scored as "fair" in terms of City support. This was a preliminary determination based on the reality that the results may be generally supported by City staff and officials, but that implementation could be complicated. TAC input will be used to determine the final scoring for City Support. Information will be collected at the next TAC meeting and incorporated into the final report.

Improvement cost, ROW impact, funding availability, and environmental impact were determined to be not applicable. Each included strategy would be implemented as a City code amendment or City staff function without the costs, impacts, or funding needs associated with infrastructure based improvements.

3.2.2.2. Transportation Network

The two strategies included in the transportation network alternative are detailed in Section 2.2.2. These include targeting new commercial developments on secondary or "backage roads" as opposed to Stockton Hill Road itself, as well as completing the street grid within the corridor which would require some new road construction and parcel reassembly. For evaluation purposes, both strategies were screened against the criteria described in Section 3.1. Screening results are shown in Table 19.

The targeting of new developments away from Stockton Hill Road would be expected to disperse traffic throughout the corridor and decrease conflicts along the main thoroughfare, resulting in positive safety and mobility impacts for all modes. The strategy was also determined to have only moderate environmental and visual quality impacts from the resulting new construction on vacant lots. Based on feedback received, it is assumed this strategy would also be generally accepted by the public.

Targeting new developments away from Stockton Hill Road would be implemented as an internal City function without the costs or impacts associated with new infrastructure. Therefore, improvement cost, ROW impact, and funding availability were deemed not applicable to the strategy. However, it was also determined that the strategy could further complicate the development review process, thus receiving only a “fair” score in terms of City support.

Completing the street grid within the corridor could prove more difficult in terms of the improvement cost, ROW impact, and environmental impact of new construction, with only a fair likelihood of available funding. Also, although the fully realized network would benefit safety and mobility for all modes, implementation resulting in some parcel reassembly and increased traffic on roads closer to residential areas would not be expected to have substantial support from the public or City representatives.

Table 19: Evaluation of Transportation Network Alternatives

Criteria	Transportation Network Alternatives	
	Targeting New Developments	Completing Street Grid (New Streets & Parcel Reassembly)
Improvement Cost	N/A	$$$
ROW Impact	N/A	Poor
Funding Availability	N/A	Fair
Safety Impact	Good	Good
Automobile Mobility	Good	Good
Pedestrian Mobility	Good	Good
Bicycle Mobility	Good	Good
Environmental Impact	Fair	Poor
Visual Quality	Fair	Good
Public Acceptance	Good	Poor
City Support	Fair	Poor

3.2.2.3. Multimodal policy

The specific policies included in the multimodal policy alternative are detailed in Section 2.2.3. For evaluation purposes, the development of a sidewalk policy, bicycle lane policy, bicycle parking policy, and midblock crossing policy were screened against the criteria described in Section 3.1, with results shown in Table 20.

Each included multimodal element would involve a visioning process and development of a strategic policy by corridor stakeholders without actual construction or installation, therefore improvement cost, ROW impact, and funding availability were considered not applicable. However, the use of these factors to evaluate specific non-motorized project recommendations is detailed in Section 3.2.1.4.

Sidewalk, bicycle lane, and midblock crossing policies were determined to have a positive impact on safety for all modes, while bicycle parking specifically would be expected to have little to no effect. A sidewalk policy would benefit the mobility for all travel modes, while a bicycle lane policy and bicycle parking policy would substantially benefit bicycle mobility with only minimal effects on automobile or pedestrian mobility. A midblock crossing policy would be similar in that it would greatly benefit pedestrians, with only moderate impacts on automobiles or cyclists.

All the included policies were also considered beneficial in terms of environmental impact and visual quality, as well as generally acceptable by the public and City based on feedback received.

Table 20: Evaluation of Transportation Network Alternatives

Criteria	Multimodal Policy Alternatives				
	Sidewalk Policy	Bicycle Lane Policy	Bicycle Parking Policy	Midblock Crossing Policy	Transit Amenity Policy
Improvement Cost	N/A	N/A	N/A	N/A	N/A
ROW Impact	N/A	N/A	N/A	N/A	N/A
Funding Availability	N/A	N/A	N/A	N/A	N/A
Safety Impact	Good	Good	Fair	Good	Good
Automobile Mobility	Fair	Fair	Fair	fair	fair
Pedestrian Mobility	Good	Fair	Fair	Good	Good
Bicycle Mobility	Good	Good	Good	Fair	Good
Environmental Impact	Good	Good	Good	Good	Good
Visual Quality	Good	Good	Good	Good	Good
Public Acceptance	Good	Good	Good	Good	Good
City Support	Good	Good	Good	Good	Good

4.0 IMPLEMENTATION STRATEGY

The previous sections have presented a number of approaches for improving the mobility and development framework of the Stockton Hill Road corridor. Each broad approach encompasses several specific strategies which were documented and evaluated in Section 3.0. Based on the evaluation, which considered input and guidance from the public and TAC, elements of each approach were selected as optimal improvement projects and policy recommendations for the corridor.

This section identifies and prioritizes corridor recommendations for implementation. Each set of recommendations has been grouped into near term, mid term, and long term actions, representing time frames of 5, 10, and 15 years. These recommendations are explained in Sections 4.1 through 4.7 and summarized in Tables 21 and 22. In addition, location specific near term and mid term recommendations are displayed where possible in Figure 19 and Figure 20.

4.1. Traffic Operations

Concerning the traffic operations approaches discussed in Section 2.1.1, it is recommended that near term improvements be focused on optimizing the traffic signal timing within the corridor. After initial optimization, next steps would include verifying the operational effectiveness of existing signal control hardware, and the installation of an interconnect system for maintaining signal coordination. Midterm actions would focus on the development and implementation of an ITS system which would address any limitations of signal prioritization, and would include the development of performance measurement metrics to analyze data from the central system. A longer term goal would be to design and construct a traffic management center to better manage operations throughout Kingman.

4.2. Access Control

The initial recommended action regarding access control is the development of a comprehensive access control plan for the corridor, which would coincide with improvements of driveway locations with the most immediate need and benefit for the lowest cost (locations 4, 6, 9, and 14 discussed in Section 2.1.2). Property owner coordination would be required for all through access improvements, which is a process that would also have to begin during the near term, followed by the planning and improvement of through access locations 3 and 12, as well as median locations 1, 2, and 11. Tasks most appropriate for the mid term timeframe are the improvement of driveway locations 7 and 15, as well as through access locations 5, 8, 10 and 13. All recommended access improvements would require maintenance and monitoring over the long term.

4.3. Beverly Avenue Intersection Improvements

Immediate recommendations for the Beverly Avenue and Stockton Hill Road intersection are to conduct a more detailed feasibility study of the elongated roundabout design concept discussed in section 2.1.3, as well as to begin the processes of identifying funding sources and stakeholder coordination. Although the elongated roundabout is the more expensive Beverly Ave alternative, through additional traffic analysis, the J-Hook concept will fail to provide adequate traffic capacity in the year 2020. In the mid term, it is recommended that the actual development of the preferred improvement be carried out, including the preparation of the environmental document, final design, and construction. Maintenance and monitoring of the project would take place in the long term.

4.4. Non Motorized Improvements

Recommended near term actions for corridor non motorized improvements include continuing with the programmed bicycle and pedestrian improvements on Gordon Drive, the planning and construction of a midblock pedestrian crossing at KRMC, and evaluating of the feasibility of upgrading the Stockton Hill Road wide curb lane to a marked bicycle lane for improved bicycle mobility and safety. Other near term recommendations are to begin to identify and secure funding sources for other non motorized improvements, and to begin property owner coordination. It is also recommended to begin to develop a network of pedestrian and bicycle facilities in the near term by finalizing plans and constructing sidewalk improvements and bicycle lanes on Western Avenue and Glen Road while coordinating with other roadway improvements.

Mid term actions would involve continuing to develop the non motorized network by planning and constructing sidewalk improvements on Airway Avenue, Sycamore Avenue, Beverly Avenue, and Burbank Street to address existing sidewalk gaps. This would be followed by the planning and construction of bicycle lanes on Burbank Street/ Fairgrounds Avenue, Harrison Street/ Willow Road, Sycamore Avenue, and Airway Avenue. All mid term improvements would also be coordinated with other roadway improvement projects. Maintenance and monitoring of the project would take place in the long term. The specific location and extents of each recommended bicycle and pedestrian improvement is detailed in Section 2.1.4.

Table 21: Implementation Strategy for Mobility Alternatives

Improvement Approach	Implementation Strategy		
	Near Term Action	Mid Term Action	Long Term Action
Mobility Approaches			
Traffic Operations	1. Optimize traffic signal timing for the corridor 2. Verify operational effectiveness of existing signal control hardware 3. Install an Interconnect system for maintaining signal coordination	1. Develop and implement ITS system based to compliment limitations of signal optimization 2. Develop performance measurement metrics for Central System data 3. Evaluate need for capacity improvement after incorporating access control improvements at Beverly	1. Design and construct a traffic management center to manage operations
Access Control	1. Develop and adopt comprehensive access control plan for the corridor 2. Improve driveway locations 4, 6, 9, and 14 3. Begin property owner coordination for all thru-access improvements 4. Finalize plans and improve thru-access locations 12 and 3, and median locations 1, 2, and 11	1. Improve driveway locations 7 and 15 2. Finalize plans and improve thru-access locations 5, 8,10 and 13	1. Maintenance and monitoring of improvements
Beverly Avenue Intersection	1. Conduct more detailed feasibility study 2. Identify funding sources 3. Begin stakeholder coordination	1. Prepare Environmental document 2. Design final Improvements 3. Construct improvements	1. Maintenance and monitoring of improvements
Non-motorized improvements	1. Continue with programmed improvements on Gordon Drive 2. Finalize plans and construct midblock crossing at KRMC 3. Evaluate feasibility of upgrading the Stockton Hill Road wide curb lane to bicycle lane 4. Identify and secure funding sources improvements 5. Begin property owner coordination 6. Finalize plans and construct sidewalk improvements and bicycle lanes on Western Avenue and Glen Road, coordinated with roadway improvements	1. Finalize plans and construct sidewalk improvements on Airway Avenue, Sycamore Avenue, Beverly Avenue, and Burbank Street / Fairgrounds Avenue, coordinated with roadway improvements 2. Finalize plans and construct bicycle lanes on Burbank Street/ Fairgrounds Avenue, Harrison Street/ Willow Road, Sycamore Avenue, and Airway Avenue, coordinated with roadway improvements	1. Maintenance and monitoring of improvements

4.5. Development Policy

As with all recommendations associated with development framework approaches, the initial recommended action for City staff to conduct a visioning process with stakeholders to establish long term development goals for the corridor. Other recommended actions in the near term are for development review staff to emphasize and encourage optimized driveway location and access design, landscape buffers, and combined access and parking during the site plan review process. The establishment of a maximum parking requirement, and the development of corridor polices for desired building frontage and setback requirements, corner lot size minimums, and outparcel access would also be appropriate in the near term.

In the mid term City staff should work to amend the City of Kingman zoning ordinance to include new standards for lot size and access that were established as part of the previous development policy visioning process. Staff should also develop a shared parking and access incentive program to encourage adjacent property owners to better utilize facilities without affecting corridor mobility or visual quality. Over the long term it is recommended that the desired development goals and vision for the corridor are continually reviewed and updated. Specific standards and strategies to augment development policy are detailed in Section 2.2.1.

4.6. Street Network Policy

For street network policy development, it is also recommended that a visioning process to establish goals be the initial priority. The targeting of new commercial developments within existing commercial zones on Western Avenue and Glen Road can also begin in the near term, as well as beginning outreach with existing property owners on the long term vision of the corridor network concept. A preliminary network concept is described in section 2.2.2.

Recommended mid term actions include the identification of priority parcels in need of reassembly based on the established network vision. During the long term time frame, it is recommended that the network vision and goals are continually reviewed and updated, and that the planning a construction of new collector streets take place where feasible, building towards a fully realized redundant street network.

4.7. Multimodal Policy

The initial recommended actions for multimodal policy are to conduct a visioning process to establish multimodal transportation goals for the corridor, followed by the development of specific corridor policies for midblock crossings, sidewalk improvements, bicycle lane improvements, and bicycle parking as discussed in Section 2.2.3.

Recommendations most appropriate for mid term implementation include the prioritization of target locations and construction of midblock pedestrian crossings in the areas of most immediate need, as well as the development of a policy requiring the inclusion of feasible bicycle and pedestrian facilities as part of future roadway projects. Over the long term it is recommended that the desired development goals and vision for the corridor are continually reviewed and updated.

Table 22: Implementation Strategy for Development Framework Alternatives

Improvement Alternative	Implementation Strategy		
	Near Term Action	Mid Term Action	Long Term Action
Development Framework Approaches			
Development Policy	1. Conduct visioning process to establish long term development goals for the corridor 2. Emphasize and encourage optimized driveway location and access design, landscape buffers, and combined access and parking during the development review process 3. Establish maximum parking requirement 4. Develop corridor policies for desired frontage and setback requirements, corner lot sizes, and outparcel access 5. Utilize PUD zone to apply desired standards on a preliminary site by site basis	1. Amend City of Kingman zoning ordinance to include new standards for lot size and access established during the visioning process 2. Develop shared parking and access incentive program	1. Continually review and update development vision and goals
Street Network Policy	1. Conduct visioning process to establish goals for corridor street network strategy 2. Emphasize the targeting of new commercial developments on Western Avenue and Glen Road during the development review process 3. Begin property owner coordination	1. Identify priority parcels in need of reassembly based on network vision	1. Continually review and update network vision and goals 2. Plan for and construct new collector streets where feasible to complete a fully realized redundant street network
Multimodal Policy	1. Conduct visioning process to establish multimodal transportation goals for the corridor 2. Develop corridor policies for midblock crossings, sidewalk improvements, bicycle lane improvements, and bicycle parking	1. Prioritize target areas for midblock crossings and construct crossings at problem locations 2. Implement policy of including bicycle and pedestrian facilities as part of future roadway projects within the corridor	1. Continually review and update multimodal vision and goals

Figure 19: Near Term Improvements

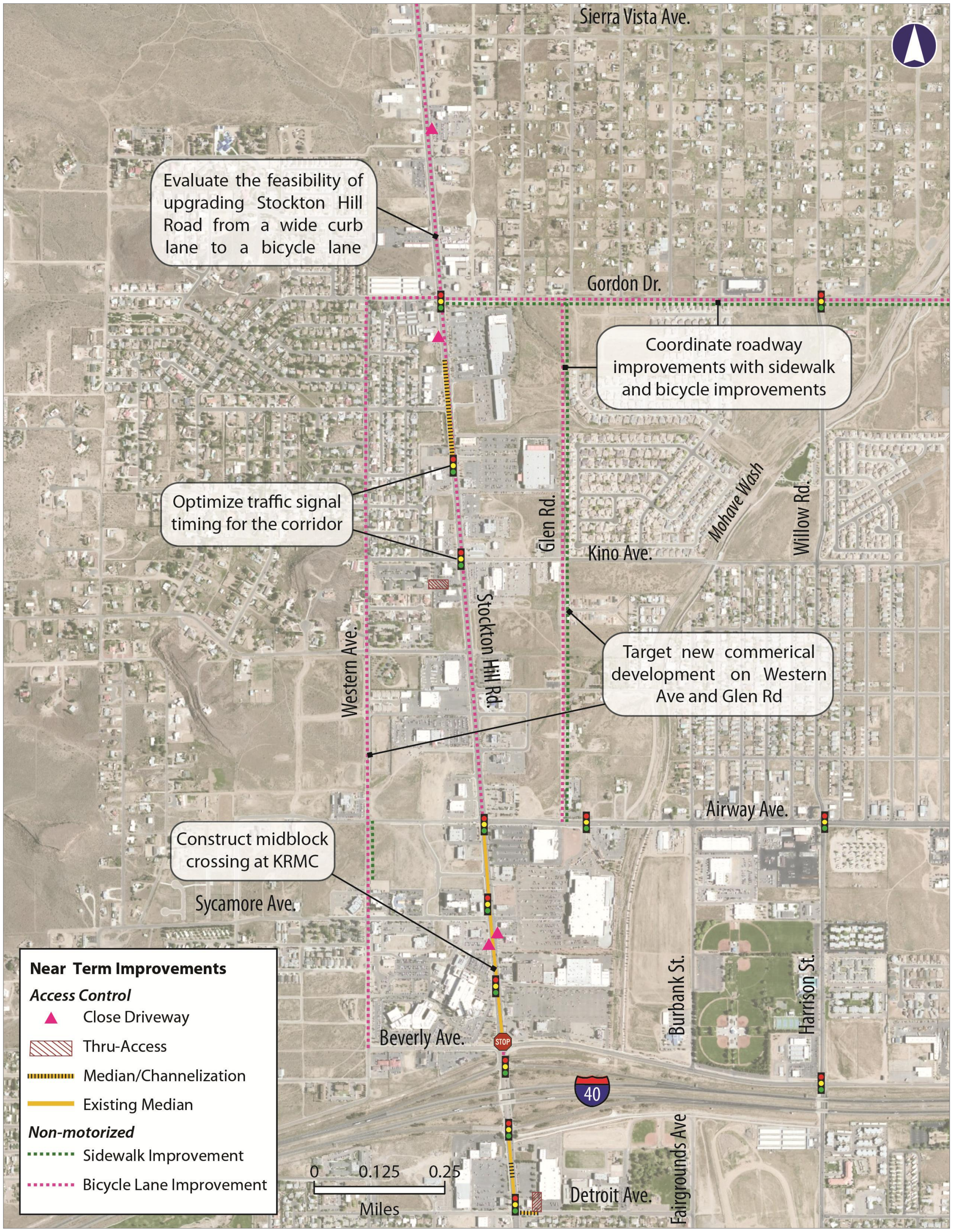


Figure 20: Mid Term Improvements

5.0 CONCLUSION

This working paper introduced and evaluated multiple mobility and development framework approaches to address the deficiencies described in Section 1.2. Each approach included several specific improvements or strategies that were evaluated, prioritized, and recommended for implementation within an appropriate time frame. The recommendations and implementation strategy described in Section 4.0 will be confirmed by the TAC, and compiled in a final report along with a summary of input received from public involvement and outreach activities, recommendations regarding future studies in the area, and a list of prioritized future projects within the corridor.

6.0 APPENDIX

6.1. Land Use Policy

Land-use policy is an essential component in a community achieving its desired vision for a corridor. As discussed in Section 1.2.5, the current land-use pattern within the Stockton Hill Road corridor is that of an automobile oriented commercial strip, with inconsistent lot depths, and narrow parcel frontages. These conditions encourage continued automobile use, while discouraging pedestrian activity and compounding access management issues.

The Kingman General Plan states that there is continued commercial growth anticipated for the corridor, and also that there are opportunities for increased residential growth in adjacent neighborhoods. In addition, stakeholders have expressed an interest in shaping a land-use scheme that includes a more compact development form including opportunities for mixed-use developments, which has been shown to create greater potential for pedestrian mobility, access management, and economic viability.

Land Use Typologies

This section contains descriptions of typical land use typologies for office, entertainment/retail, mixed use commercial, and mixed use residential uses, which are each applicable within the study area. Each typology includes ideal characteristics based on national best practices that can be used to serve as an example and guide a community vision specific to Kingman. It is important to note that the characteristics listed are heavily dependent on the local context in which they are applied. These descriptions may not all be applicable to Kingman, but are meant to serve as best practice examples of ideal development scenarios. Community stakeholders must first undergo a detailed visioning session before augmenting policies to accommodate the characteristics listed.

Office Typology

IDEAL LAND USE CHARACTERISTICS:

- Density: 2-4 story buildings and 50% site coverage
- Land Use Mix: Office and Institutional only
- Pedestrian: Wide internal walkways, logical connections and streetscape amenities
- Community Character: Attractive internal public spaces and public gathering areas

IDEAL SITE CRITERIA:

- Continuous ground-floor commercial / office uses that activate streetscape
- Office Use
- Building setbacks transition to building heights

- Buildings oriented to street and street corners, with 70% building façade transparency
- Surface parking located at interior of blocks
- Alleys provide service access for buildings
- Internal site on-street parking required except for timed loading zones
- Mixed-use parking garage with ground floor office uses
- Buildings provide space for pedestrian amenities
- Minimum 12 foot sidewalk from curb to building face
- Street width maximum width 52 feet; with on-street parking

Figure 1: Ideal Office Site Criteria

Alfred Park Place, Chandler, AZ *(under construction)*

Entertainment/ Retail Typology

IDEAL LAND USE CHARACTERISTICS:

- _Density:_ 2-3 story buildings and 50% site coverage
- _Land Use Mix:_ Entertainment and retail only
- _Pedestrian:_ Wide internal walkways, logical connections and streetscape amenities
- _Community Character:_ Attractive internal public spaces and public gathering areas
- _Complementary Uses:_ Mixed-use commercial and mixed use residential

IDEAL SITE CRITERIA:

- 2-3 stories of retail / entertainment uses
- Differentiated building heights provide for a more interesting streetscape and allows light to reach the street
- Maximum height at building corners provides a visual reference for pedestrians and motorists
- Building setbacks transition to building heights
- Buildings oriented to street and street corners on at least 2 sides of the block, with 70% building façade transparency

- Surface parking located behind buildings and away from primary street frontages
- Defining primary streets to front buildings and entrances allows for surface parking on secondary streets
- On-street parking required except for timed loading zones
- Buildings provide space for pedestrian amenities
- Minimum 12 foot sidewalk from curb to building face
- Develop streetscape characters that define the district as a destination and place
- Street maximum width 52 feet; with on-street parking

Figure 2: Ideal Entertainment/ Retail Site Criteria

The Shops at Lake Havasu, Lake Havasu, AZ

Tempe Marketplace, Tempe, AZ

<u>Mixed-Use Commercial Typology</u>

IDEAL LAND USE CHARACTERISTICS:

- <u>Density:</u> 2-4 story buildings and 70 - 80% lot coverage
- <u>Land Use Mix:</u> Ground floor retail or office uses required, neighborhood services, office, or commercial on upper floors, with minimum ground floor height of 16'
- <u>Pedestrian:</u> Wide sidewalks, with convenient connections and community amenities
- <u>Community Character:</u> Flexible community gathering spaces, civic land uses, street amenities and neighborhood services
- <u>Complementary Adjoining Uses:</u> Mixed-use residential

IDEAL SITE CRITERIA:

- Continuous ground-floor retail or office that activates streetscape, with additional height at corners to help define intersections
- Lower stories at midblock sections that allows sunlight to reach the street and provide variation along the building frontage
- Lower stories at midblock sections that allows sunlight to reach the street and provide variation along the building frontage
- Mixed-use buildings with ground floor retail oriented to street corners

- Commercial units oriented towards streetscape allow for more "eyes on the street" for enhanced security
- Alleys provide service access for buildings and provide a transition area for building scale
- Surface parking to the rear or side of building
- Curb extensions with stripped crosswalks
- Landscaped area provides rest area
- Reduced setback and similar architectural facades complimentary to mixed-use commercial units
- Multi-family mixed use units with articulated facades complimentary to mixed-use commercial units
- Block circumference – 2,000 linear feet maximum
- 6 foot wide minimum sidewalk separated from curb with linear planting area suitable for trees and streetscape amenities
- Local street width: 38 feet maximum curb to curb

Figure 3: Ideal Mixed-Use Commercial Site Criteria

Heritage Marketplace, Gilbert, AZ (*planned*)

<u>*Mixed-Use Residential Typology*</u>

IDEAL LAND USE CHARACTERISTICS:

- <u>Density:</u> 12-20 units per acre, with 2-4 story buildings and 70 - 80% lot coverage
- <u>Land Use Mix:</u> Ground floor retail or office uses required, residential units on upper floors, with minimum ground floor height of 16'
- <u>Pedestrian:</u> Wide sidewalks, with convenient connections and community amenities
- <u>Community Character:</u> Flexible community gathering spaces, civic land uses, street amenities and neighborhood services
- <u>Complementary Adjoining Uses:</u> Mixed-use commercial

IDEAL SITE CRITERIA:

- Continuous ground-floor retail or office that activates streetscape
- Single-family attached townhouses with attached parking in rear
- Single-family attached townhouses with attached parking in rear

- Mixed-use building with ground floor retail oriented to street corners
- Residential units oriented towards streetscape allow more "eyes on the street" for enhanced security
- Alleys provide service access for buildings and provides a transition area for building scale and use
- Surface parking to the rear or side of building
- Curb extensions with stripped crosswalks
- Recreation area
- Reduced setback and similar architectural styles on either side of the block balance and unify streetscape
- Multi-family units with articulated facades complimentary to attached single family units
- Block circumference – 2,000 linear feet maximum
- 6 foot wide minimum sidewalk separated from curb with linear planting area suitable for trees and streetscape amenities

Figure 4: Ideal Mixed-Use Residential Site Criteria

Grigio Metro, Tempe, AZ

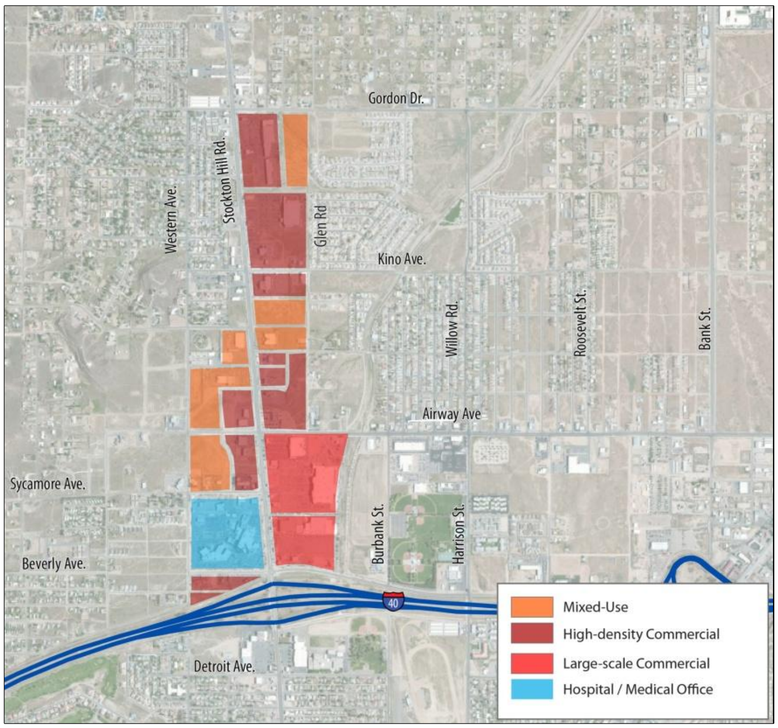
Southgate Complex, Lake Havasu, AZ

Conceptual Target Areas

Figure 5 describes possible preliminary conceptual target areas for ideal land use typologies within the Stockton Hill Road corridor. For instance, developments following ideal office typology characteristics could be concentrated in the area west of

Stockton Hill Road and south of Sycamore Avenue, near or adjacent to the Kingman Regional Medical Center. Mixed use residential could be implemented in the areas outlined in orange, and entertainment/ retail and mixed use commercial implemented in the dark red areas. Under this conceptual scenario, the light red areas would be preserved for large-scale big box commercial.

Figure 5: Preliminary Mixed-Use Target Areas



As stated previously concerning ideal land use typologies, these preliminary target areas represent one possible land-use vision for the Stockton Hill Road corridor. They are based on national best practices and may not all apply to Kingman. Community stakeholders must first conduct a formal visioning process and land-use analysis before targeting corridor locations for specific land-use types. In addition, many of the ideal site characteristics may not conform fully to currently adopted City of Kingman property development rules, parking regulations, or street and sidewalk development rules. However, a residential and commercial mixed-use land-use type would currently be allowed along the corridor within C-1, C-2, and C-3 zoning districts.

The development of a land-use scheme for the corridor that accommodates a more compact development form, including mixed-use land use types, would offer greater potential for pedestrian mobility, access management and economic viability. In order to implement an updated land-use scheme for the corridor, stakeholders must undertake a formal visioning process and develop a targeted corridor land-use policy.

6.2. Potential Funding Sources

This section summarizes potential local, state, and federal funding sources for the multimodal improvements for the Stockton Hill Road corridor described throughout this working paper. As transportation project funding sources are somewhat limited and continually changing given the present economic and political environment, it is important to note that the development of all recommendations could require multiple funding sources and/or the identification of new funding sources.

6.2.1. Local Funding Sources

Improvement Districts

Improvement districts are formed by the partnering of property owners with the City to finance public works improvements. Districts are initiated to fund projects that benefit the community such as roadways, landscaping, parking, and other public facilities. Property owners are given a several-year window to repay their share of the improvement cost.

Revenue Bonds

Revenue bonds are issues by municipalities to fund public work projects such as roadways. They are not a direct funding source, but can expedite construction by distributing capital improvement costs over the life of a project.

General Fund

The General Fund is the primary fund of the City. It includes all revenues that are not assigned to a special purpose fund such as sales taxes and licensing fees.

Development Impact Fees

Development impact fees are one-time payments imposed by the local government to build or expand public facilities for a new commercial or residential development. Impact fees are proportionate to the cost required to accommodate the nature and size of a given development. Funds acquired from impact fees are meant to pay for the construction or expansion of offsite capital improvements. They may not, however, be used for rehabilitation efforts or operating costs.

6.2.2. State Funding Sources

Economic Strength Project Program

Through the Economic Strength Project Program, the Arizona Commerce Authority distributes grants for projects that support economic development. The program is continuously funded through HURF and is typically available new roadways, roadway upgrades, and routine maintenance. At the time of the report, specific rules for grant awards were being finalized.

Greater Arizona Development Authority

The Arizona State Legislature created the Greater Arizona Development Authority (GADA) to aide local and tribal governments enhance their community and economic development opportunities through the development of public infrastructure. GADA offers financial and technical assistance programs to assist political subdivisions, special districts, and Indian tribes with their public facilities. GADA funds are used to lower financing costs and accelerate projects.

Highway Extension Expansion and Loan Program

The Highway Extension Expansion Loan Program (HELP) is managed by ADOT and provides loans and financial assistance for highway projects in Arizona. The objective of HELP is to accelerate the funding of general transportation and construction projects. HELP subsidizes interest rates and does not require an application fee. However, the program is currently not accepting applications due to state budget issues.

Highway User Revenue Fund

The Highway User Revenue Fund (HURF) is collected by the state from transportation revenues such as gasoline and vehicle license taxes. They represent the bulk of the State's transportation fund and can only be used on highway construction and improvements. ADOT distributes HURF funds to municipalities based on population.

Transportation, Community, and System Preservation Program

The Transportation, Community, and System Preservation (TCSP) Program provides grants to municipal projects that: (1) improve transportation efficiency, (2) reduce environmental impacts of transportation, (3) reduce the need for costly future public infrastructure, (4) ensure efficient access to jobs, services, and (5) examine community development patterns and identify strategies to encourage private sector development patterns that achieve these goals. The purpose of the program is to identify private sector-based initiatives to improve the relationships between transportation, community, and system preservation plans and practices.

Transportation Alternatives Program

The recently passed MAP-21 federal transportation bill (Summer 2012) consolidated the former Safe Routes to School (SRTS) and Transportation Enhancement programs into the new Transportation Alternatives Program. ADOT is currently preparing rules and program guidance, but eligible local projects will likely include those that encourage alternative transportation.

6.2.3. Federal Funding Sources

Highway Safety Improvement Program

The Highway Safety Improvement Program (HSIP) is managed by the FHWA and ADOT and funds safety improvement projects that reduce the number and/or severity of highway-related collisions.

National Highway System Program

The National Highway System (NHS) Program funds roadway improvements to rural and urban roads that are a part of the NHS, including the Interstate System, and designated connections to major intermodal terminals. The NHS Program may also fund transit improvements in NHS corridors.

Surface Transportation Program

The Surface Transportation Program (STP) is a flexible funding program funds general transportation, environmental, and transit projects. The STP is managed by FHWA and ADOT and applies to projects on federal-aid highways, urban arterials and collectors, rural arterials and collectors, bridge projects on public roads, transit capital projects, and intracity/intercity bus terminals and facilities.

6.3. References

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City of Kingman, Arizona – *General Plan 2020 (2003)*

City of Kingman, Arizona – *I-40 Stockton Hill Road Traffic Interchange – Initial Design Concept Report (1999)*

City of Kingman, Arizona – *Kingman Bicycle and Pedestrian Plan* (2000)

City of Kingman, Arizona – *Kingman Area Transportation Study* (2011)

City of Kingman, Arizona – *Zoning Ordinance* (2012)

City of Mesa, Arizona – *Zoning Ordinance* (2011)

City of Peoria, Arizona – *Access Management Guidelines* (2011)

City of Prescott, Arizona – *Land Development Code* (2011)

City of Tempe, Arizona – *Zoning & Development Code* (2006)

United States Department of Transportation (USDOT) – *ITS Benefits Database*